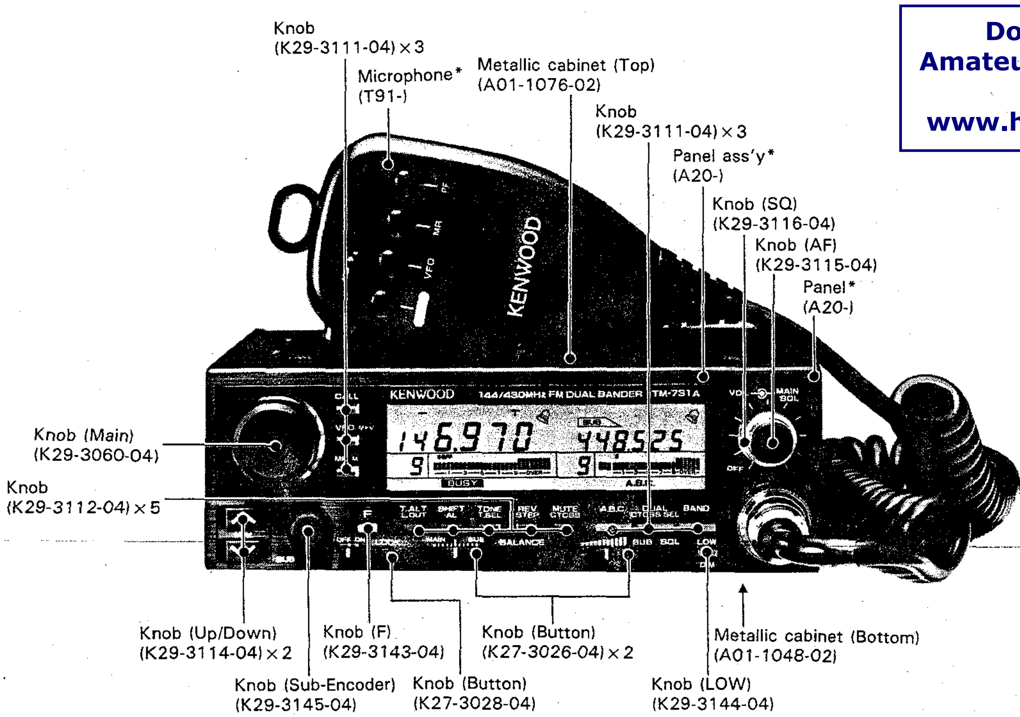
144/430MHz FM DUAL BANDER

TM-731A/E

SERVICE MANUAL

KENWOOD

B51-8015-00(T)1349



*Refer to parts list on page 25.
Photo is TM-731A.

CONTENTS

CIRCUIT DESCRIPTION

Frequency Configuration

The TM-731A/E uses a synthesized PLL and includes a variablefrequency oscillator that enables selection of 5 kHz, 10 kHz, 12.5 kHz, 20 kHz, or 25 kHz channel steps. **(See Fig. 1.)**

Signals received in the 144 MHz band are down-converted to a first intermediate frequency of 10.7 MHz (M,W) and 16.9 MHz (K,P) by mixing with the first local oscillator frequency (133.3 MHz to 135.3 MHz (W), 127 MHz to 131.100 MHz (K,P), 133.3 MHz to 137.30 MHz (M)), and then to the second intermediate frequency of 455 kHz by mixing with the second local oscillator frequency of 10.245 MHz (M,W) and 17.355 MHz (K,P).

Signals received in the 430 MHz band are down-converted to the first intermediate frequency of 30.825 MHz (M,W) and 21.6 MHz (K,P) by mixing with the first local oscillator frequency (399.175 MHz to 409.175 MHz (M,W), 416.400 MHz to 428.400 MHz (K,P)), and then to the second intermediate frequency of 455 kHz by mixing with the second local oscillator frequency of 30.37 MHz (M,W) and 21.145 MHz (K,P). Double conversion is thus used for both the 144 MHz and 430 MHz bands.

The transmitted signal for both bands is generated direct oscillation and direct frequency division in the phaselocked loop. The signal is amplified by a linear amplifier before being applied for the antenna.

Unit \ Model	TM-731A (K,M,P)	TM-731E (W)
Final Unit	X45-3340-11 (K,P) X45-3340-21 (M)	X45-3340-61
Control Unit	X53-3250-11 (K,P) X53-3250-21 (M)	X53-3250-61
430 MHz TX-RX Unit	X57-3390-11 (K,P) X57-3390-21 (M)	X57-3390-21
144 MHz TX-RX Unit	X57-3400-11 (K,P) X57-3400-21 (M)	X57-3400-61

Table 1 Comparison of TM-731A and TM-731E

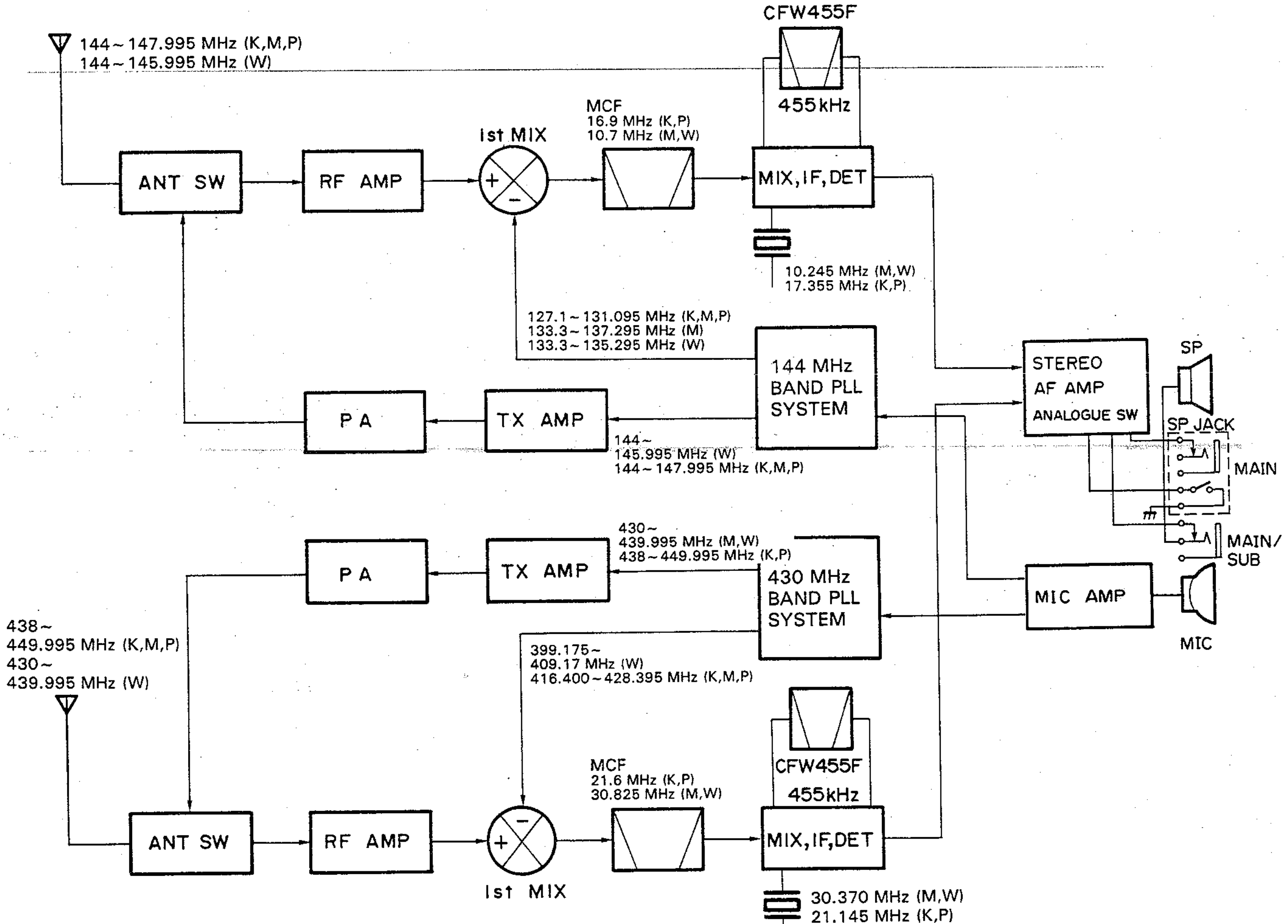


Fig. 1 Frequency Configuration

CIRCUIT DESCRIPTION

Receiver Circuits

• General

This set uses seperate receiver circuits for the 144 MHz and 430 MHz bands. These circuits extend from the antenna input section to the IF detector.

• 144 MHz

The incoming two meter band signal passes thru the transmit/receive switching diode in the final unit. And then through the antenna matching coil in the front unit. It is then amplified by a GaAs FET radio-frequency amplifier, Filtered by a three-stage bandpass filter that uses varicap tuning to reject unwanted signal components, and is fed to the first mixer. There it is mixed with the first local oscillator signal from the PLL to generate the first IF signal (10.7 MHz (M,W), 16.9 MHz (K,P)). Spurious adjacent-channel signals are removed in a two-stage MCF (Monolithic Crystal Filter).
The first IF signal is amplified and fed to the FM IF IC:MC3361D. This IF signal is mixed with the second local oscillator frequency of 10.245 MHz (M,W) and 17.355 MHz (K,P) which results in a second IF signal of 455 kHz.
Spurious adjacent-channel signals are removed from the second IF signal by ceramic filter. Then the signal is amplified and detected to generate the audio signal.

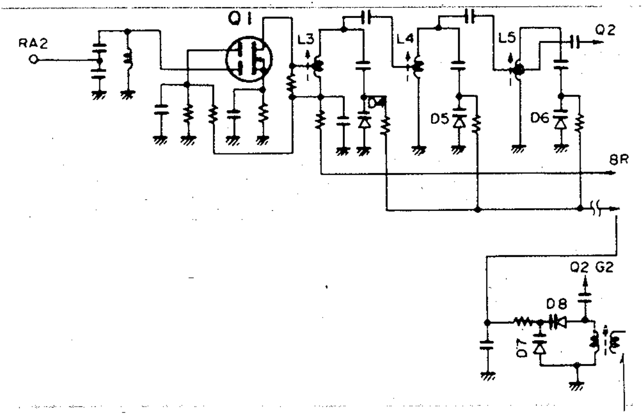


Fig. 2 144 MHz Front End (Varicap Tuning)

• 430 MHz band

The incoming 70 cm signal passes thru the transmit/receive antenna switching diodes in the final unit and then passes through the antenna matching coil. The signal is then fed to a two-stage radio-frequency amplifier consisting of a GaAs FET and a junction-type FET. It then passes through a two-stage two-cauity helical resonator and enters the first mixer, where it is mixed with the first local oscillator signal from the PLL to generate the first IF signal (30.825 MHz (M,W), 21.6 MHz (K,P)). Spurious adjacent-channel signals are removed by a two-stage MCF.
The first IF signal is amplified and fed to the FM IF IC (MC3361D). This IF signal is mixed with a second local oscillator frequency of 30.37 MHz (M,W) and 21.145 MHz (K,P) which converts it to a second IF signal of 455 kHz.
Spurious adjacent-channel signals are removed from the second IF signal by an ceramic filter. The signal is then amplified and detected to generate the audio signal.

Item	Specification
Nominal center frequency	30.825 MHz
Pass bandwidth	Max. ±7.5 kHz at 3 dB
Attenuation band width	Max. ±28 kHz at 40 dB
Ripple	Max. 1.5 dB
Insertion loss	Max. 3 dB
Guaranteed attenuation	60 dB or greater at ±1 MHz; 40 dB or greater for spurious signal
Terminating impedance	1.4 kΩ/1 pF

Table 2 MCF (L71-0270-05) Characteristics (430 MHz TX-RX Unit XF1) (M,T,W)

Item	Rating
Nominal center frequency (fo)	21.600 kHz
3 dB bandwidth	±7.5 kHz or more
Attenuation bandwidth	±25 kHz or less at 40 dB ±45 kHz or less at 60 dB
Guaranteed attenuation	70 dB or more within ±1 MHz (Sprious response 35 dB or more) 80 dB or more within ± (910 kHz ±20 kHz)
Ripple	1.0 dB or less
Loss	2.0 dB or less
Input and output impedance	1 kΩ/1 pF

Table 3 MCF (L71-0227-05) (430 MHz TX-RX unit XF1) (K,P)

Item	Specification
Nominal center frequency	455 kHz±1 kHz
6 dB bandwidth	Min. ±6 kHz (above 455 kHz)
50 dB bandwidth	Min. ±12.5 kHz (above 455 kHz)
Ripple (455 ±4 kHz)	Max. 3 dB
Insertion loss	Max. 6 dB
Guaranteed attenuation (455 ±100 kHz)	Max. 35 dB
Input-output matching impedance	2.0 kΩ

Table 4 Ceramic Filter CFW455F (L72-0315-05) Characteristics (430 MHz TX-RX Unit CF1, 144MHz TX-RX-Unit CF1)

Item	Rating
Nominal center frequency (fo)	16.900 kHz
3 dB bandwidth	±7.5 kHz or more
Attenuation bandwidth	±25 kHz or less at 40 dB ±45 kHz or less at 60 dB
Guaranteed attenuation	70 dB or more within ±1 MHz (Sprious response 40 dB or more) 80 dB or more within fo − (900~920 kHz)
Ripple	1.0 dB or less
Loss	1.5 dB or less
Input and output impedance	1.8 kΩ/0 pF

Table 5 MCF (L71-0279-05) Characteristics

CIRCUIT DESCRIPTION

Item	Specification
Nominal center frequency (fo)	10.7 MHz
Pass bandwidth	Max. fo ±7.5 kHz at 3 dB
Attenuation bandwidth	1) Max. ±25 kHz at 40 dB 2) Max. ±45 kHz at 60 dB
Guaranteed attenuation	70 dB or more within ±1 MHz 40 dB or more spurious 80 dB or more within −900 kHz to −920 kHz
Ripple	Max. 1 dB
Insertion loss	Max. 1.5 dB
Terminating impedance	3 kΩ/0 pF

Table 6 MCF (L71-0228-05) Characteristics (144 MHz TX-RX Unit XF1)

• AF Unit

The path from the detector output to the AF power amplifier input consists of two separate identical circuits for the main band and the subband. The audio signal is first switched by an analog switch into the AF preamplifier for its corresponding band. After amplification, the signal level is adjusted by a two-channel electronic volume control IC:M51523 which is controlled by the MAIN VOLUME and BALANCE controls on the front panel. An AF low-pass filter then removes unwanted high-frequency components. Next the separate audio signals are selected to speaker mixed or separate mode by analogue switch circuit which is amplified by the STEREO audio power amplifier before being applied the speaker. **(See Fig. 3.)**

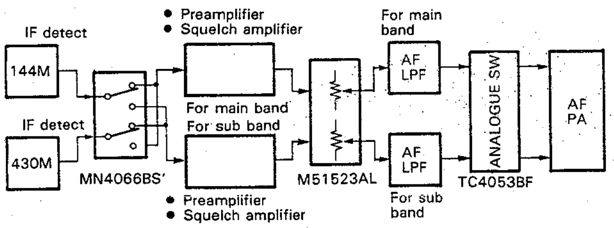


Fig. 3 AF Section

• Squelch Circuits

Independent squelch circuits are provided for the main band and subband. These circuits receive the output from the detector, remove the 50 kHz noise component, amplify the signal with two transistor stages, and rectify it by means of a diode to generate the squelch control signal. After DC amplification, the control signal is used to switch the main and sub preamplifiers on and off.

• S Meter Circuits

Independent S meter circuits for the 144 MHz and 430 MHz bands receive signals from the 455 kHz ceramic filter, amplify if in two-stage meter amplifier, and rectify the resulting signal to generate a DC voltage. The microprocessor converts the analog DC voltage to a digital output that is used to drive an LCD bar meter.

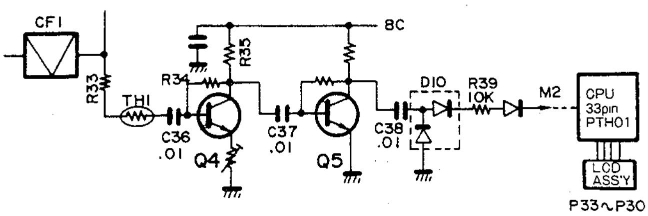


Fig. 4 144 MHz S-meter circuit

• Switching of Balance Range

To disable the BALANCE control in the single mode, the control voltage range of the BALANCE control is switched. This switching is done by a Low signal from the INH (Inhibit) pin of the microprocessor that turns on transistor Q7 in the single mode. Since the center voltage of the balance control resistor is held to approximately 4 V, the voltage at the BAL pin cannot exceed 4 V, so even if the balance VR is moved to the SUB position, the main band remains unattenuated. **(See Fig. 5 and 6.)**

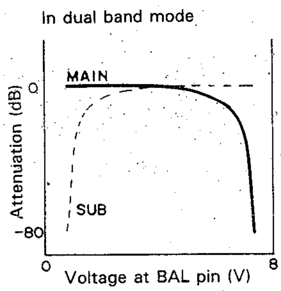


Fig. 5

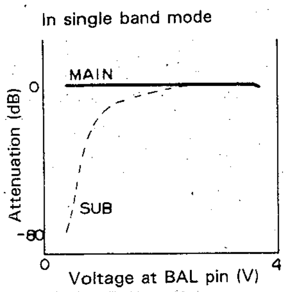


Fig. 6

During normal operation, the two electronic volume controllers in the set operate using the M51523AL, but when the remote control unit (RC-10) is connected and used to adjust the output level, they are controlled by the LC7532M.

When the remote control unit is connected, a High switch control signal is sent from the CE pin of shift register IC4 to force the attenuation of the M51523AL to zero. (Normally the CE output is Low.) The UP and DOWN signals from the shift register then vary the attenuation of the LC7532M. **(See Fig. 7.)**

CIRCUIT DESCRIPTION

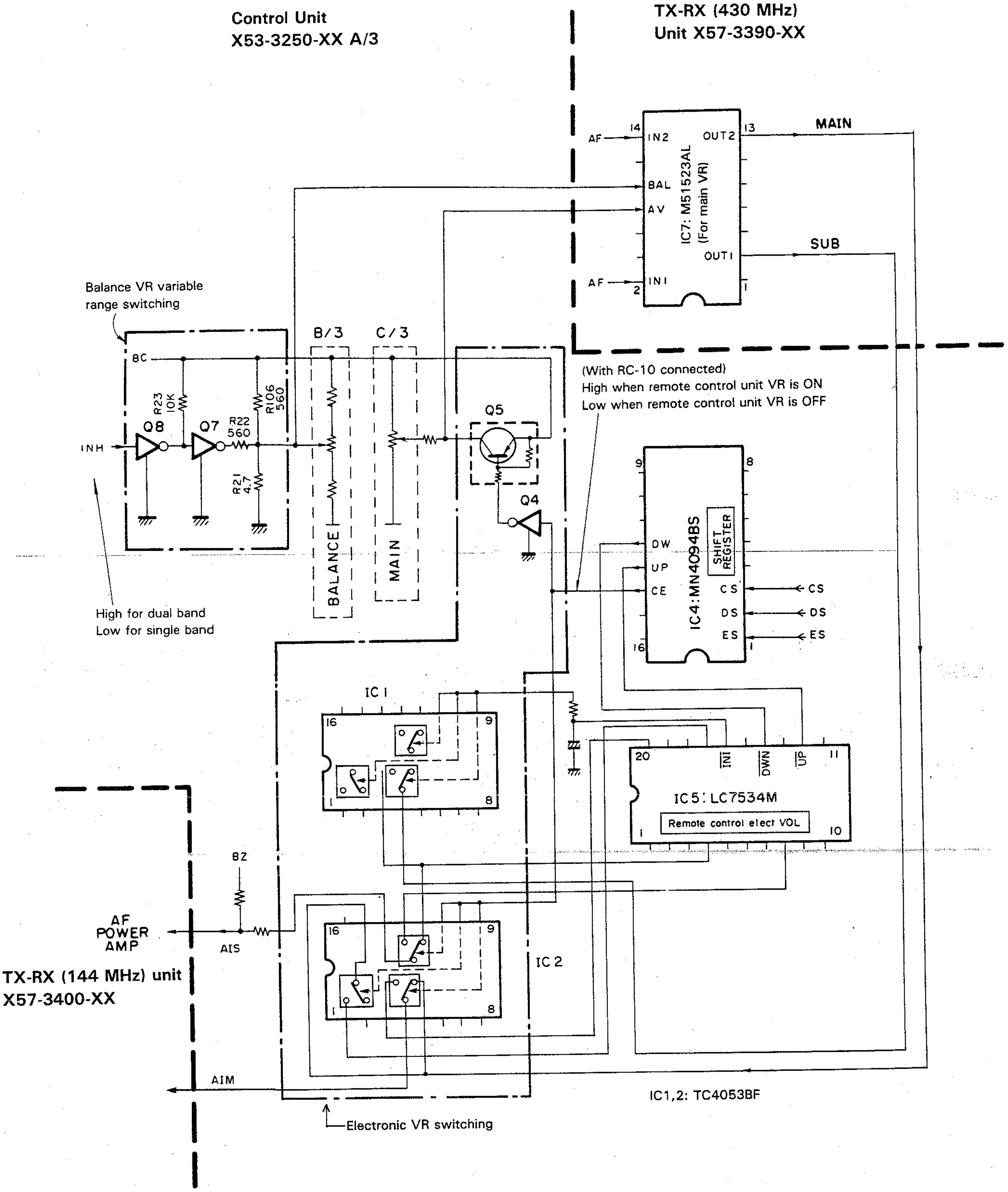


Fig. 7 AF Volume Switching Diagram

CIRCUIT DESCRIPTION

• **Muting Circuit**

There are three types of audio muting:

MU1 : Mutes the main band momentarily during memory scan etc. And during transmission.

MU2 : Mutes the subband when the CTCSS key is pressed.

MU3 : Operates when the MUTE key is pressed on the front panel.

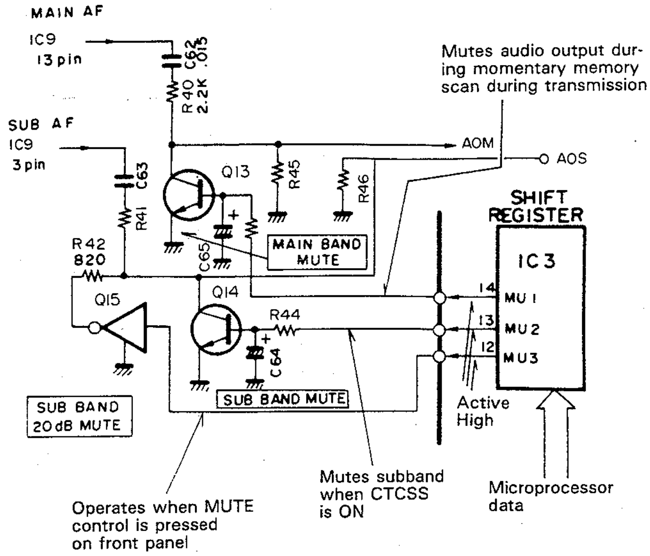


Fig. 8 Mute Circuit

• **Speaker selection**

In the TM-731A/E, a selection between the separate and mix modes is made depending upon the connection between the speaker output and the external speaker. (Refer to Table 6-1.) When the separate mode is engaged, an attenuator is inserted for level adjustment. (Refer to Figure 8-1.)

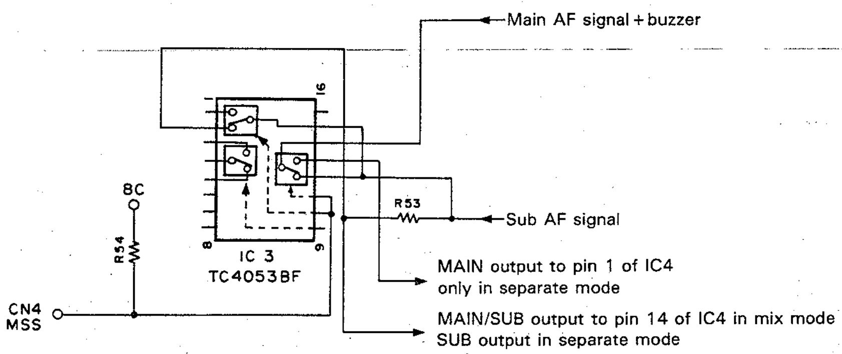


Figure 8-1 Speaker separate circuit

When the speaker jacks are connected into the MAIN terminal, the MSS terminal becomes open and the pins 10 and 11 of IC3 become "H" so that AF signals are each input to the audio amplifier (IC4) at they stand separate. While when the speaker jacks are not connected into the MAIN terminal, the MSS terminal is grounded, the pins 10 and 11 of IC3 become "L" and R53 is shorted for level adjustment so that AF signals are mixed together into only the pin 13 of IC4.

AF signal	Without external speaker	Connected only to MAIN terminal	Connected only to MAIN/SUB terminal	Connected to both MAIN and MAIN/SUB terminals
Main	Internal speaker	External speaker	External speaker	External speaker connected to MAIN terminal
Sub	Internal speaker	Internal speaker	External speaker	External speaker connected to MAIN/SUB terminal
	Mix	Separate	Mix	Separate

Table 6-1 Correspondence in connection between speaker output and external speaker

CIRCUIT DESCRIPTION

Transmitter Circuits

• General

Except for the microphone amplifier and APC (Automatic Power Control) circuits, the transmitting circuits are independent.

• Modulation Circuit

The audio signal from the microphone is fed to three operational amplifiers which perform preemphasis, amplification, and limiting, and form a splatter filter that removes unwanted high-frequency components.

The modulation circuit directly modulates the VCO (Voltage control oscillator) for the 144 MHz and 430 MHz bands by using a varicap. (**See Fig. 9.**)

MIC AMP (X59-3610-00)

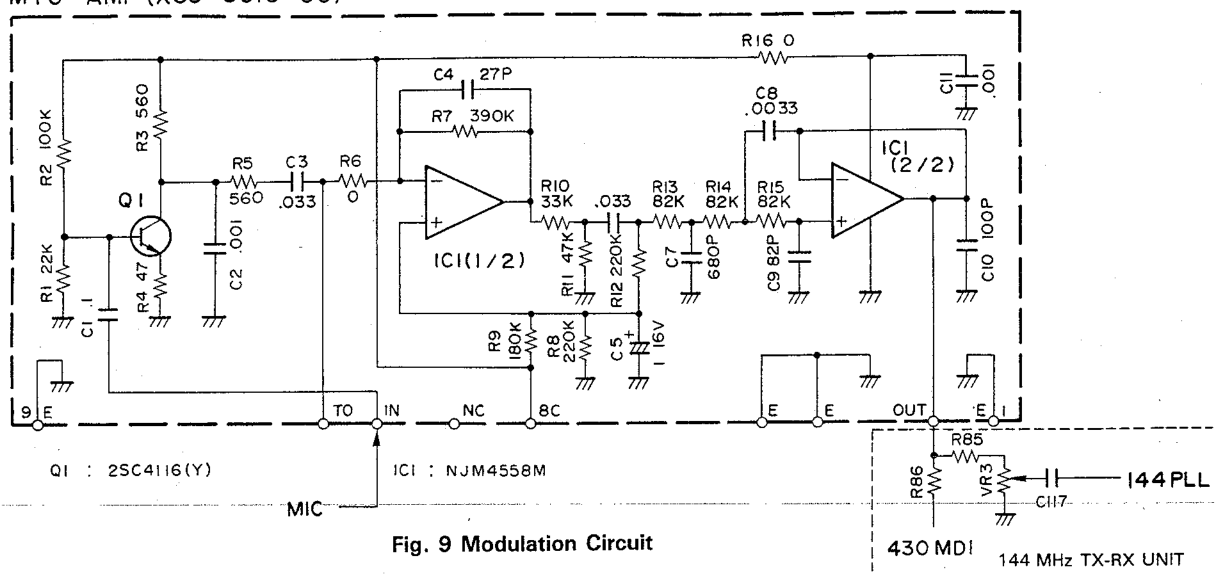


Fig. 9 Modulation Circuit

• Preamplifier Stage Circuit

A three-stage linear amplifier is used in both the 144 MHz and 430 MHz bands. Due to its wideband design, this linear amplifier provides stable drive output without adjustment.

• Power Amplifier Circuit

The drive signal is fed to the power modules and amplified to the required levels. It then passes through the TX/RX switching diode and a filter and is transmitted via the antenna.

Item	Symbol	Tc (°C)	Unit	Conditions	Rating	
					S-AV17	M57788M
Operating voltage	Vcc	25	V		16	17
Current consumption	Icc	25	A		14	14
Input power	Pin	25	W	$Z_G = Z_L = 50\ \Omega$	0.6	0.6 ($V_{CC1} \geq 13.8$ V)
Output power	Po	25	W	$Z_G = Z_L = 50\ \Omega$	65	55
Operating case temperature	Tc (op)		°C		−30 ~ +110	−30 ~ +110
Storage temperature	Tstg		°C		−40 ~ +110	−40 ~ +110

Table 7 Maximum Ratings of Power Modules

• APC and SWR (Standing Wave Retio) Protection Circuits

The APC (automatic transmit output control) circuit and protection circuit have independent detectors in both bands. The control circuit is a common hybrid IC.

The APC detects the output from the power module and feeds the result to the hybrid IC. The SWR protection circuit extracts a portion of the reflected wave generated by antenna mismatching at the CM (Capacitance Matching) coupler, detects it, and feeds the result to the hybrid IC.

The hybrid IC controls the power transistor Q5 : 2SD1406 (Y) in the drive stage, controls the drive transistor and the second pin of the power module, and thus varies the transmitter output.

CIRCUIT DESCRIPTION

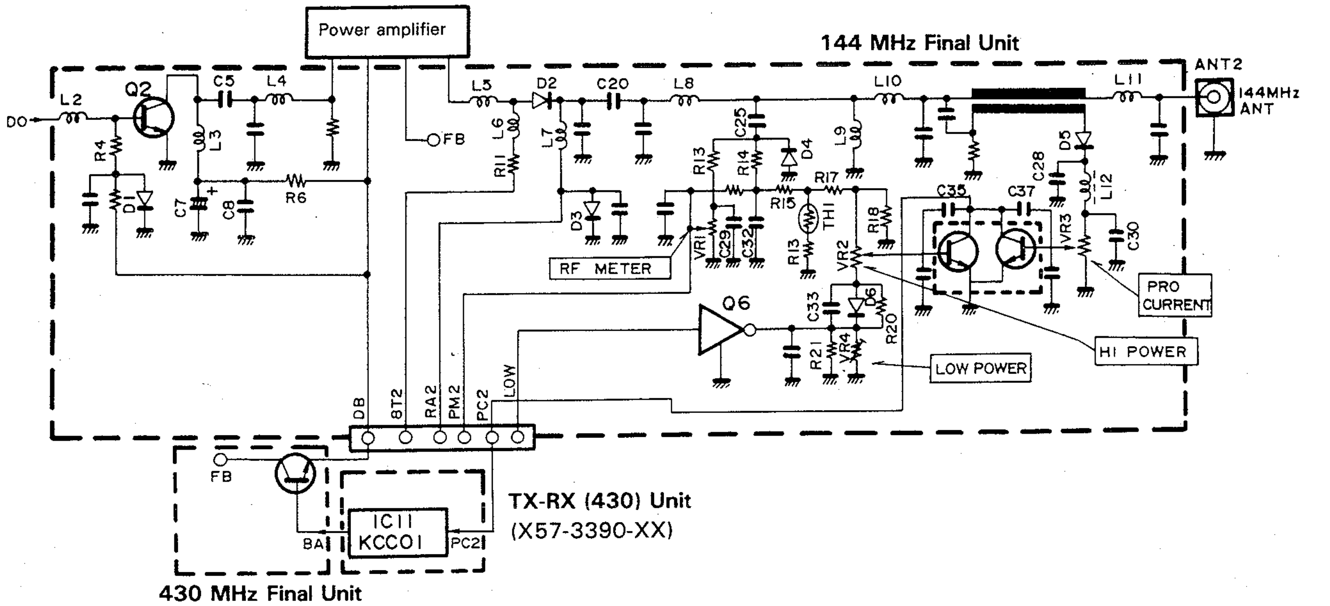


Fig. 10 APC and SWR Protection Circuits

PLL Synthesizer

Fig. 12 is a block diagram of the PLL and VCO sections of the 144 MHz and 430 MHz circuits. A feature of the PLL system in the TM-721A/E is that there are independent subunits for the 144 MHz and 430 MHz bands, each consisting of an upper VCO section and a lower PLL section. Both sections are enclosed in a sturdy case that shields them from external signals.

To provide 5 kHz, 10 kHz, 12.5 kHz, 20 kHz, and 25 kHz steps, the 12.8 MHz frequency of the reference oscillator in both the 144 MHz and 430 MHz bands is divided by 2048 and 2056 according to the step count to yield frequencies of 6.25 kHz and 5 kHz. Each VCO oscillates directly at the target frequency. After single-stage amplification, the frequency is applied to a pulse-swallow PLL IC which divides it, performs phase comparison, and locks the frequency.

The PLL system for the 144 MHz band locks without switching between TX and RX. The lock-up time of the PLL is shortened by using pin 10 of the PLL IC (M54959FP), which is Low in TX, to turn off the low-pass filter Q1 and Q2 in Fig. 13, only at the instant when the set is switched to TX, thus shortening. The time it takes the transmitter to lock.

The PLL system for the 430 MHz band locks on a single VCO, with band switching for TX and RX performed inside the VCO.

• 8T2 (Transmit 8V) and Unlock Circuit

Dueing receive, 0.7 V desional is applied to the base of Q9 which turns Q9 on, Q8 off, and Q11 off, so no voltage is output at the collector (8T2) (TX +8 V) of Q11.

When the PTT (Push-to Talk) switch is depressed, serial data is sent from the microprocessor to IC1 (the phase-locked loop) causing pin 10 of IC1 to go Low. This switches Q9 off, Q8 on, and Q11 on, so that 8 V is applied to 8T2. (In transmission, 8 V is applied to 8T2 from 8C.)

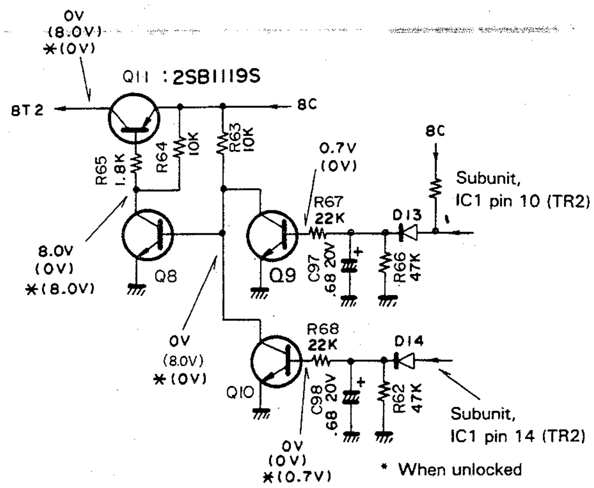


Fig. 11 8T2 (Transmit 8 V) and Transmit Unlock Circuits

CIRCUIT DESCRIPTION

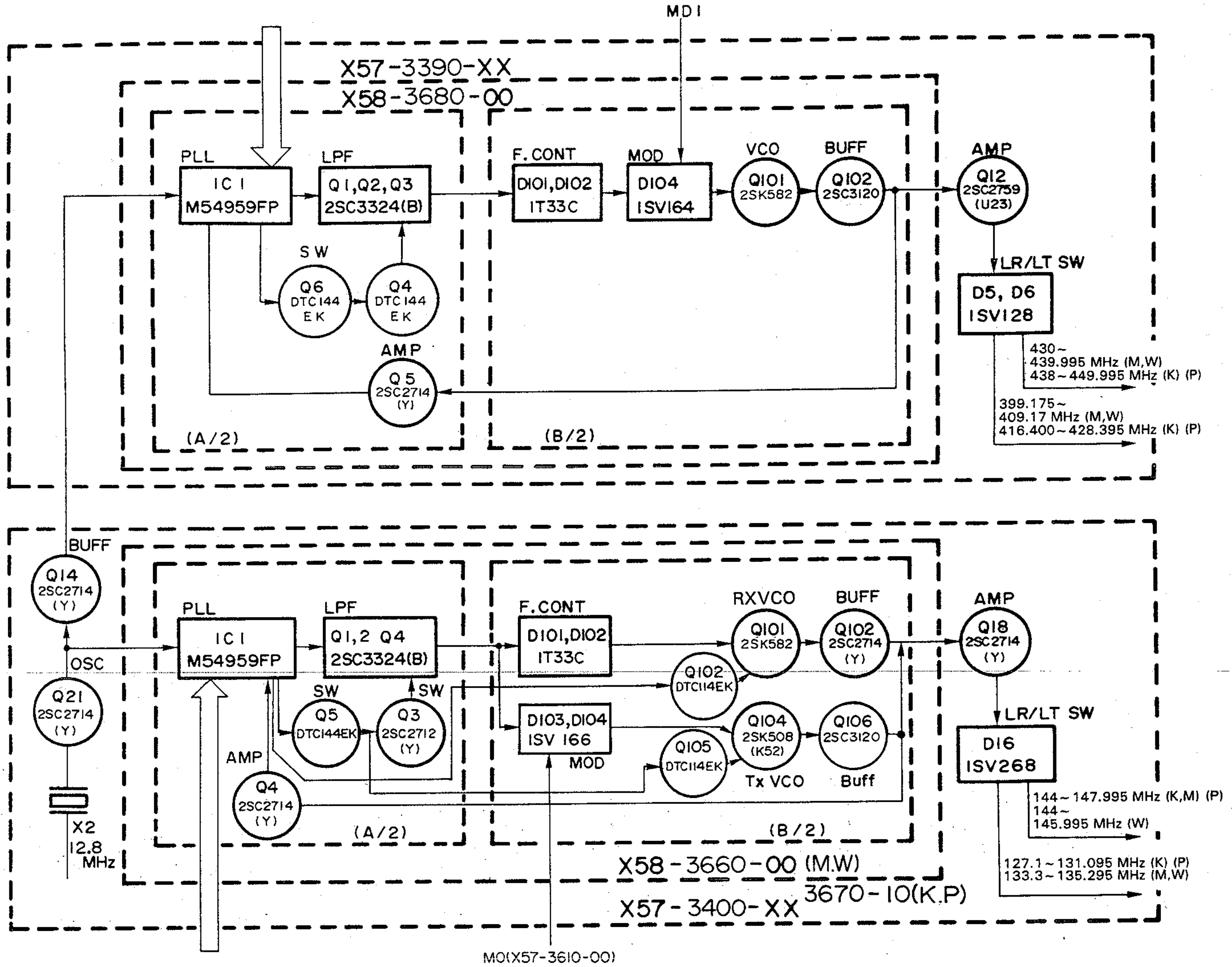


Fig. 12 PLL and VCO Block Diagram

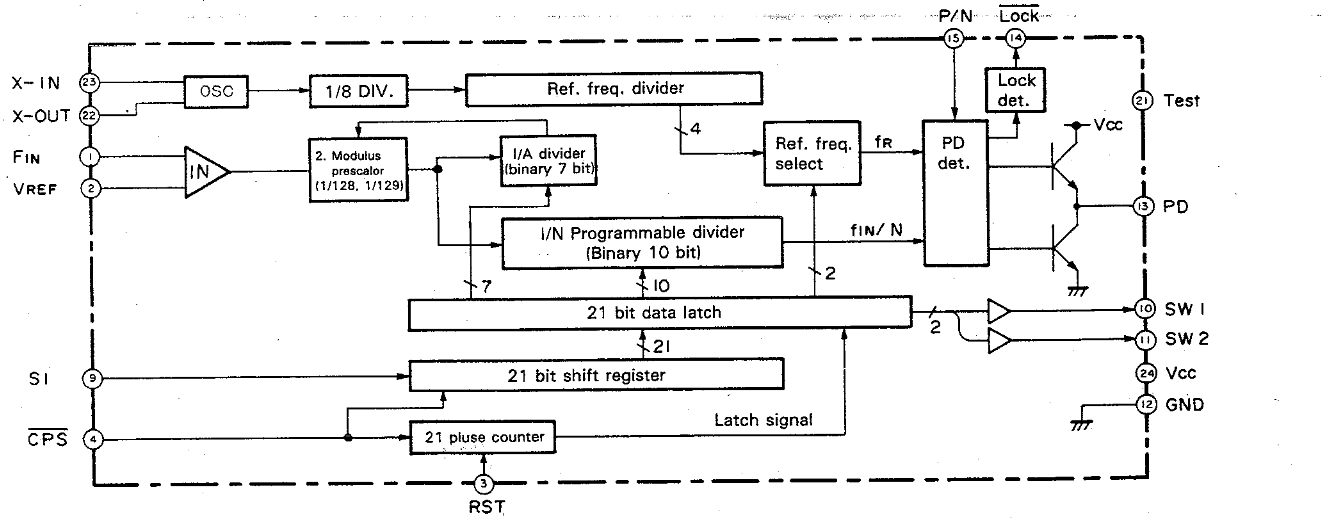


Fig. 13 M54959 Pulse Swallow Control Circuit

CIRCUIT DESCRIPTION

The unlock circuit operates only in the transmitter circuit. A description of the 430 MHz unlock circuit follows. Q10 is the PLL unlock switching transistor. Normally the base of Q10 is Low (0 V) and the collector of Q10 is High (8 V).
When the PLL unlocks 0.7 V dc is applied to the base of Q10, Turning Q10 on forcing the collector to 0 V (Low). This switches Q8 off. When the PLL unlocks (during transmission), the collector of Q8 goes to 8 V (instead of the normal 0 V) and Q11 turns off. Therefore the 8T switching transistor Q11 turns off and the transmit bias voltage goes dead. This prevents transmitter output when the PLL is unlocked.

- **8R (Receive 8 V) Stop Circuit**

In receiving, the base of Q13 receives an 5 V dcsignal that turns Q13 on (so the collector of Q13 goes to 0 V). Q12 then turns on and provides 8 V at its collector. (In receiving, 8 V is supplied from 8C (Common +8 V) to 8R.)
During transmit, serial data from the microprocessor is passed thru shift register IC4. The output from IC4 at pin 11 goes Low. Q13 therefore turns off (its collector voltage going to 8 V), Q12 turns off, and no 8R output is provided from the collector of Q12.
The PLL IC (M54959FP) can be controlled for its two reference division ratios and single comparison division ratio.
The pulse-swallow PLL circuit is contained on a single chip and consists of a built-in dual-modulus (1/128 and 1/129) prescaler.
The switch function (pin 10) of the PLL IC controls the 8T1 (TX +8 V (430 MHz)) and 8T2 (TX +8 V (144 MHz)) lines.

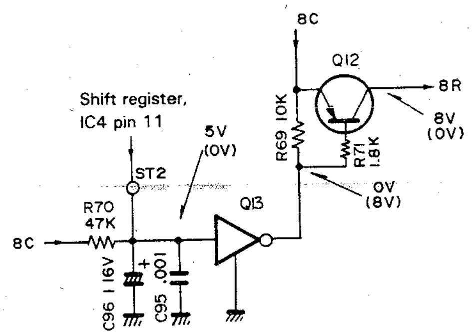


Fig. 14 8R Stop Circuit

In the 144 MHz band, the relation ship between Fvco1 and the division ratios is:

$F_{vco1} = (144-10.7) = \{(n1 \times 128) + A1\} \times Fosc + R$

- Fvco1 : Output frequency of 144 MHz-band VCO
- n1 : Value to which binary 10-bit programmable counter is set
- A1 : Value to which binary 7-bit programmable counter is set
- Fosc : Reference oscillator frequency, 12.8 MHz
- R : Value to which binary 14-bit programmable counter is set
  - R = 2560 for 5 kHz, 10 kHz, 20 kHz, and 25 kHz steps
  - R = 2048 for 12.5 kHz steps

If n1 = 208, A1 = 36, then with 5 kHz, 10 kHz, 20 kHz, or 25 kHz steps:

$$F_{vco1} = \{(208 \times 128) + 36\} \times 12800 \div 2560$$
$$= (26624 + 36) \times 5$$
$$= 133300 = 133.3 \text{ MHz}$$

In the 430 MHz band the relation between Fvco2 (RX) and the division ratios is:

$F_{vco2} = (430-30.825) = \{(n2 \times 128) + A2\} \times Fosc \div R$

Fvco2:Output frequency of 430 MHz-band VCO
R and Fosc: Same step frequencies as in the 144 MHz band
In this case n2 = 623 and A2 = 91, so:

$$F_{vco2} = \{(623 \times 128) + 91\} \times 12800 \div 2560$$
$$= (79744 + 91) \times 5$$
$$= 399175 = 399.175 \text{ MHz}$$

CIRCUIT DESCRIPTION

Digital Control Section

• General

The digital control section contains a single microprocessor (CPU) that controls all transceiver functions. As shown in the block diagram in **Fig. 15**, it also includes the key, switch, and rotary encoder input circuits, display circuit, reset and backup circuits, and tone output circuit.

Table 8 lists the pin functions of IC101.

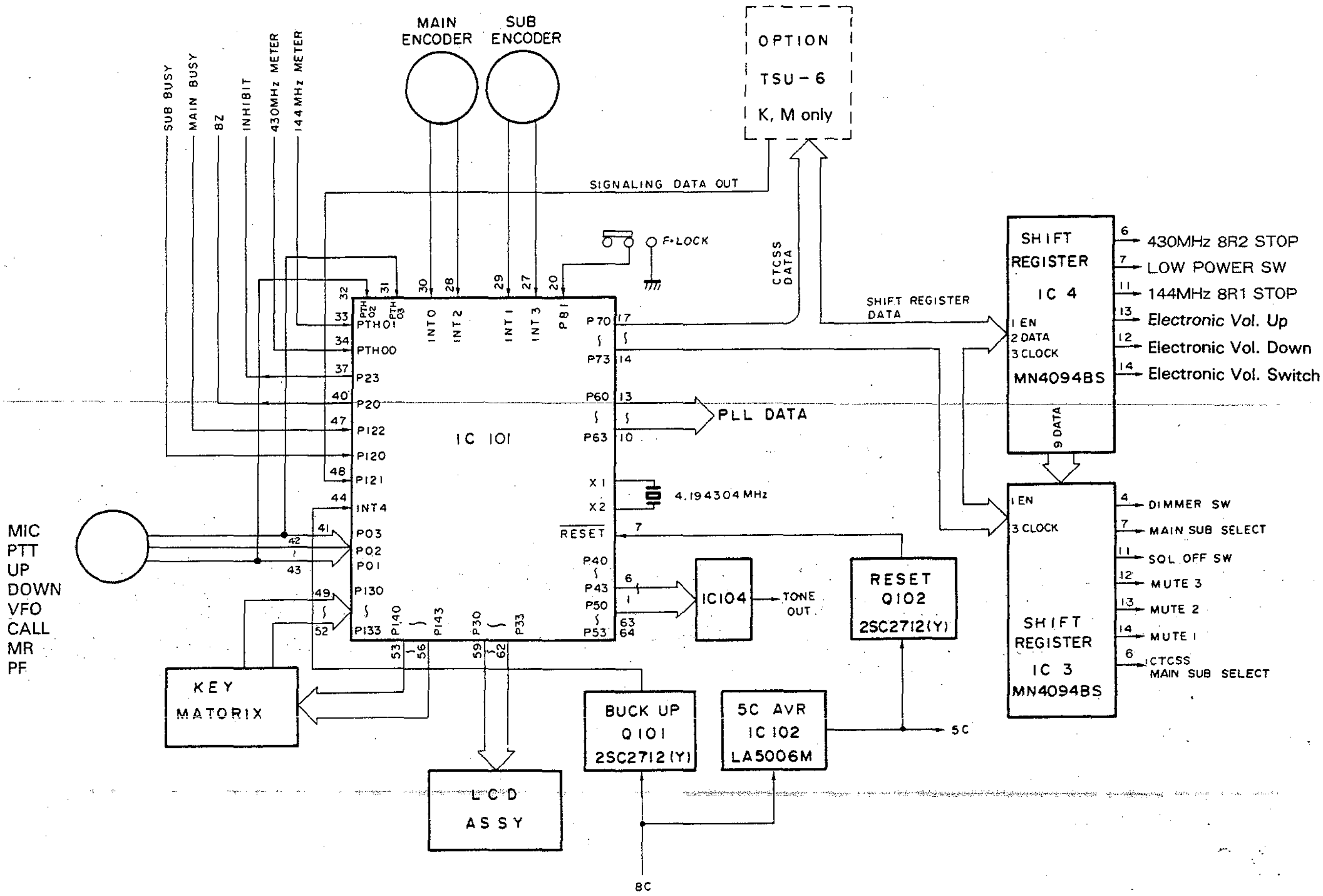


Fig. 15 Control Section Block Diagram

CIRCUIT DESCRIPTION

Pin No.	Name	I/O	Logic	Function
1	P41	O	–	D-A converter digital output
2	P40	O	–	
3	P53	O	–	
4	P52	O	–	
5	P51	O	–	
6	P50	O	–	
7	RESET	I	L	Reset input
8	X2	–	–	4.194304 MHz crystal oscillator
9	X1	–	–	
10	P63	O	L	PLL IC (144 MHz) enable output
11	P62	O	L	PLL IC (430 MHz) enable output
12	P61	O	–	PLL IC data output
13	P60	O	–	PLL IC clock output
14	P73	O	H	CTCSS enable output
15	P72	O	H	Shift register enable output
16	P71	O	–	Shift register and CTCSS (Continuous Tone Coded Squelch System) lock output
17	P70	O	–	Shift register and CTCSS data output
18	P83	I	L	Not connected
19	P82	–	–	
20	P81	I	L	LOCK switch input
21	P80	I	L	Not connected
22	P93	I	H	Destination input
23	P92	I	H	
24	P91	I	H	
25	P90	I	L	Not connected
26	Vss	–	–	Ground (0 V)
27	INT3	I	–	Sub encoder data input
28	INT2	I	–	Main encoder data input
29	INT1	I	–	Sub encoder clock input
30	INT0	I	–	Main encoder clock input
31	PTH03	I	H	MIC DOWN switch input
32	PTH02	I	H	MIC UP switch input

Pin No.	Name	I/O	Logic	Function
33	PTH01	I	–	144 MHz S/RF meter analog input
34	PTH00	I	–	430 MHz S/RF meter analog input
35	T11	–	L	Not connected
36	T10	–	L	
37	P23	O	L	Output during single operation
38	P22	O	–	Not connected
39	P21	O	–	Not connected
40	P20	O	–	Beep tone generator
41	P03/S1	I/I	L/–	Microphone DOWN switch input/serial data input
42	P02/S0	I/O	L/–	Microphone PTT switch input/serial data output
43	P01/SCK	I/–	L/–	Microphone UP switch input/serial clock input/ output
44	INT4	I	H	Backup detector input
45	P123	I	H	Remote control unit connection-detect input (Only when connected)
46	P122	I	L	Main band BUSY input
47	P121	I	H	CTCSS tone count input
48	P120	I	L	Subband BUSY input
49	P133	I	L	Key input
50	P132	I	L	
51	P131	I	L	
52	P130	I	L	
53	P143	O	L	Key output
54	P142	O	L	
55	P141	O	L	
56	P140	O	L	
57	NC	–	–	
58	VDD	–	–	Power pin (5 V)
59	P33	O	–	LCD driver data output
60	P32	O	–	LCD driver clock output
61	P31	O		Sub LCD driver enable output
62	P30	O		Main LCD driver enable output
63	P43	O	–	D-A converter digital output
64	P42	O	–	

Table 8 μPD75112GF-530-3BE Pin Functions (Control Unit IC)

• Key and Rotary Encoder Input Circuit

Fig. 16 shows the key and rotary encoder input circuit. The keys on the front panel form a matrix which the microprocessor reads by scanning. Signals from the two rotary encoders (MAIN and SUB), the microswitches (PTT, UP, DOWN) and the F.LOCK switch are applied to the CPU directly.

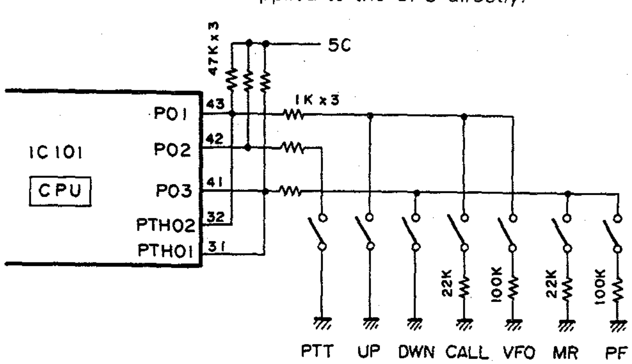


Fig. 16-1 Microphone key input circuit

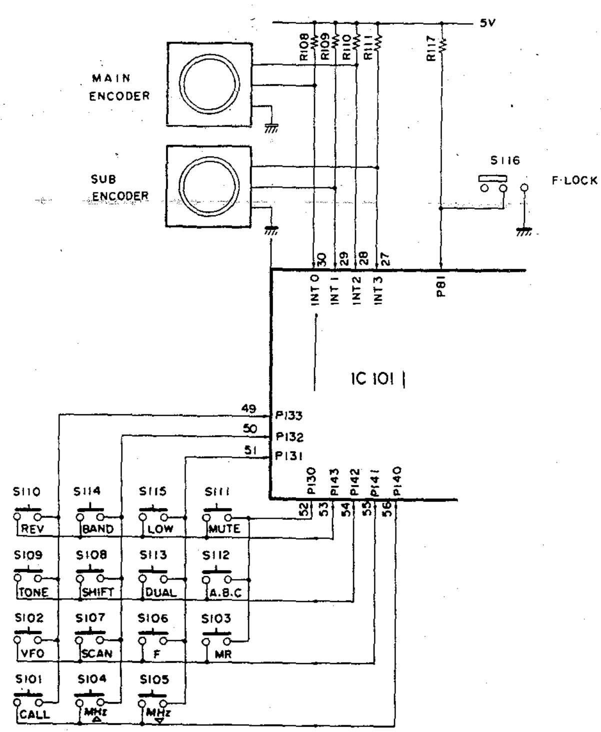


Fig. 16 Key, Switch, and Rotary Encoder Input Circuit

CIRCUIT DESCRIPTION

• ***Reset and Backup Circuits***

Fig. 17 shows the reset and backup circuits.
When power is switched on, the reset circuit applies a Low pulse with a duration of approximately 3 mS to the RESET input of the microprocessor. This causes a power-on reset. When power is switched off, the backup circuit detects the voltage drop on the 8 V line and applies a High signal to the INT4 input of the microprocessor. This places the microprocessor in the backup state.

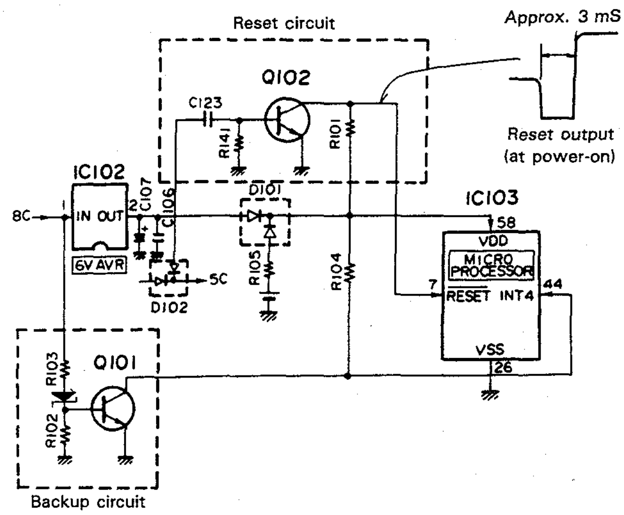


Fig. 17 Reset and Backup Circuits

• **Display Circuit**

Located on the LCD assembly, the display circuit consists of two LCD drivers, one for the main band and one for the subband, together with their supporting circuits and the liquid crystal display. (**See Fig. 18.**) The LCD is driven dynamically with a 50% duty cycle. The data to be displayed is sent as serial data to the LCD from pins P30 to P33 of the microprocessor. In single operation, the microprocessor sends the subband LCD driver an inhibit signal to suppress the subband display.

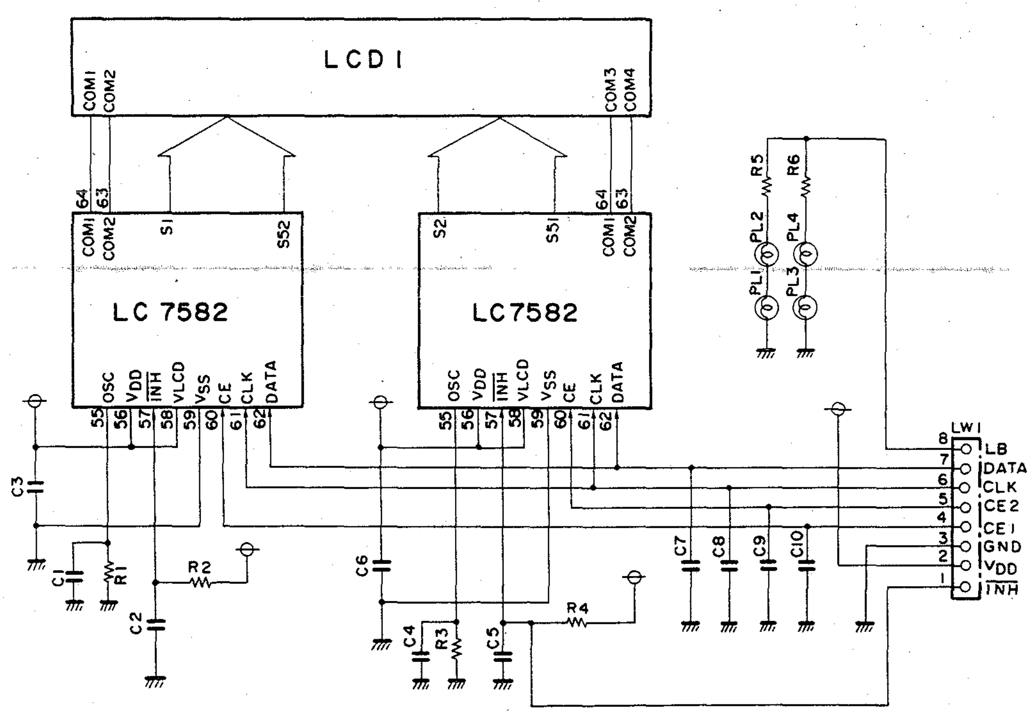


Fig. 18 LCD Assembly (B38-0317-05)

CIRCUIT DESCRIPTION

- **PLL Data Output**

Pins P60 (CP (PLL Clock)), P61 (DP (DLL Data)), P62 (EP1 (430 MHz PLL Enable)), and P63 (EP2 (144 MHz PLL Enable)) of the microprocessor supply the PLL data.
Fig. 19 indicates the bit structure of the data.
Fig. 20 indicates the timing of the data transfer.

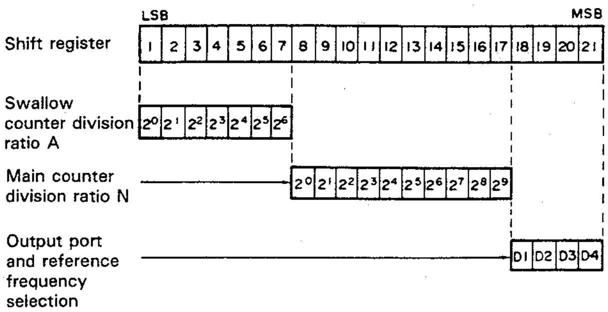


Fig. 19 PLL Data Structure

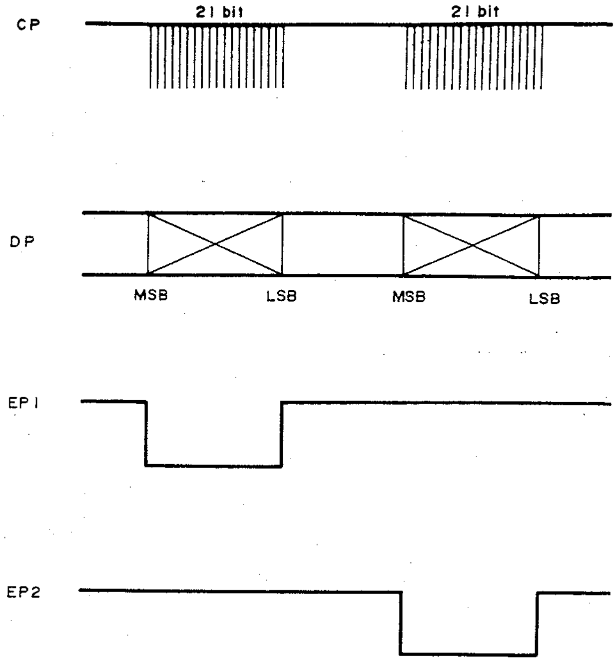


Fig. 20 PLL Data Transfer Timing

144 MHz Band

The 21 data bits are obtained as follows:

1. Division data A and N (17 bits)

F (displayed value − 10.7 MHz in RX)
= {(N × 128) + A} × 12.8 MHz ÷ ref
N: 10-bit binary value; division ratio of main counter
A: 7-bit binary value; division ratio of swallow counter

2. Reference frequency (ref) selection (2 bits)

Data		Phase reference frequency	
D1	D2		
L	L	5 kHz	With 5 kHz, 10 kHz, 20 kHz, or 25 kHz steps
H	L	6.25 kHz	With 12.5 kHz steps

3. Switch selection (2 bits)

Data		Output port			
D3	D4	SW1	SW2		
H	H	H	H	At RX	With ACC OFF
L	H	L	H	At TX	With ACC OFF
H	L	H	L	At RX	With ACC ON
L	H	L	H	At TX	With ACC ON

430 MHz Band

The 21 data bits are derived as follows:

1. Division data A and N (17 bits)

F (displayed value − 30.825 MHz in RX)
= {(N × 128) + A} × 12.8 MHz ÷ ref
N: 10-bit binary value; division ratio of main counter
A: 7-bit binary value; division ratio of swallow counter

2. Reference frequency (ref) selection (2 bits)

Data		Phase reference frequency	
D1	D2		
L	L	5 kHz	With 5 kHz, 10 kHz, 20 kHz, or 25 kHz steps
H	L	6.25 kHz	With 12.5 kHz steps

3. Switch selection (2 bits)

Data		Output port		
D3	D4	SW1	SW2	
H	H	H	H	At RX
L	H	L	H	At TX

CIRCUIT DESCRIPTION

• Shift Register Circuit

By shifting serial data from the microprocessors, the two shift registers (IC3 and IC4) perform the following control functions:

- Main and sub standby control
- Muting control
- Low power control
- Electronic volume control, UP/DOWN switching
- Dimmer control
- Main/sub select
- Squelch off control
- CTCSS MAIN, SUB select

• Dimmer Control Circuit

Fig. 21 shows the AVR circuit in the LB. The LB (Lamp +B) voltage is lowered by switching the reference voltage zener diodes.

Normally the base voltage of Q2 is held to approximately 11 V by the 11 V zener diode D1:02CZ11Y, and the pilot lamp voltage LB is approximately 10.5 V. When the DIM switch is set to the ON position, 5 V dc is obtained from pin 4 of shift register IC3, causing Q3 DCT 114EK to go from High to Low, thereby connecting zener diode D2:02Z8ZY in parallel to D1.

Therefore, the base voltage of Q2 is held to the zener voltage (8.2 V) of D2, resulting in a drop to approximately 8.5 V. The pilot lamp voltage LB then drops to approximately 7.8 V and the pilot lamp dims.

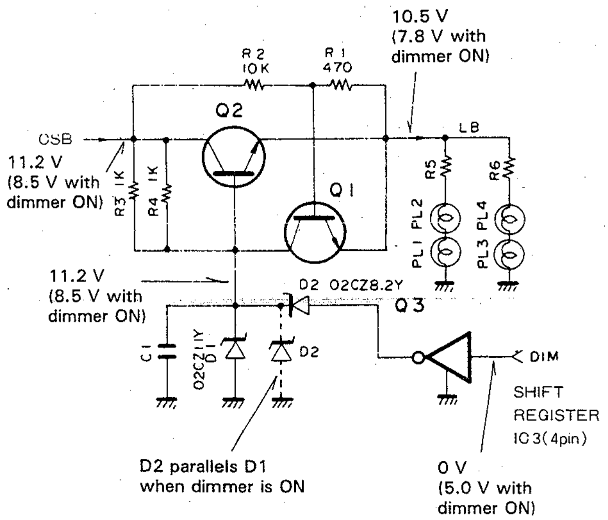


Fig. 21 LB (Lamp +B) AVR Circuit

• Squelch-Off Circuit (When RC-10 is Connected)

Fig. 22 shows the squelch-off circuit. This circuit opens the squelch gate for the main band from the remote controller when the remote control unit is used.

When the RC-10 is connected, it communicates with the microprocessor in the set via pins 2, 3, and 4 of the microphone connector. When the RC-10 is connected, the exchange of data with the microprocessor causes pin 11 of shift register IC3 to provide a High switch control signal, so transistor Q9 goes Low and the SQL pin is dropped to ground level.

The result is that the squelch VR for the main band is left open. Part of the main noise amplifier output is fed from the RD (Remote Data) pin to pin 6 of the microphone connector, and from there to the RC-10.

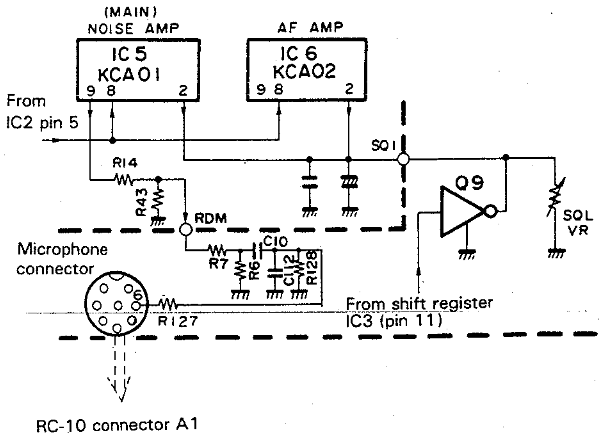


Fig. 22 Squelch Off Circuit

• Beep Tone

The microprocessor generates a beep tone of approximately 1.2 kHz at pin P20. This signal is reshaped into a rectangular wave by an C, R wave-shaping circuit.

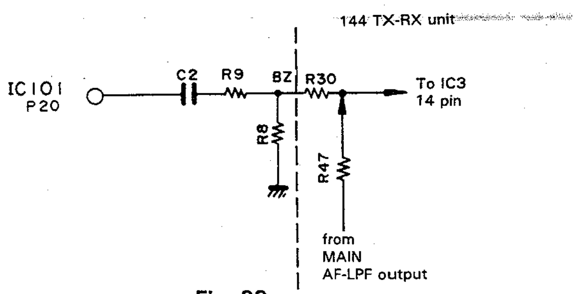


Fig. 23

CIRCUIT DESCRIPTION

• Tone Output

Signals from pins P40 to P43 and P50 to P53 of the microprocessor are fed to a ladder resistor network (IC104) which performs D-A conversion and provides 38 signals ranging from 67.0 to 250.3.

Fig. 24 shows the internal structure of IC104.

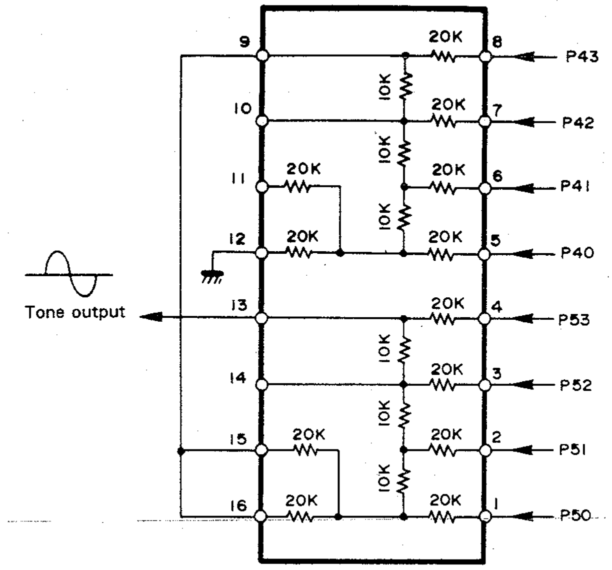


Fig. 24 Ladder Network: Internal Structure of KRR-C001 (Control Unit IC104)

• S meter and RF meter input

The S meter and RF meter voltages are coupled separately for the main band and subband and are provided as the M1 and M2 inputs to the PTH00 and PTH01 pins of the microprocessor. The input voltage is converted internally to a 4-bit digital value (16 levels) and sent to the display.

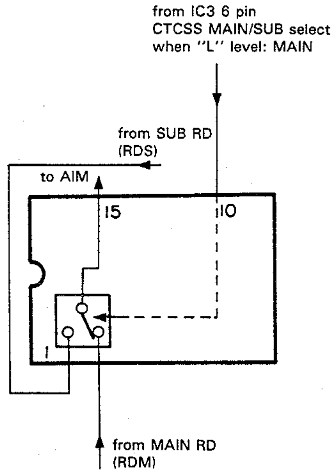
• Busy Input

BUSY signals are supplied separately to the microprocessor for the main band and subband. If squelch is on, the microprocessor receives a Low input when the received signal is present, and lights the BUSY indicator.

• Input and Output for CTCSS Unit (Option)

The microprocessor provides data for the CTCSS unit from pins P70, P71, and P73. This data specifies the CTCSS tone frequency and CTCSS unit on/off information.

When a tone is detected from the CTCSS unit, the microprocessor receives a High input at P121 and opens the squelch gate.



• Input and Output for Remote Control Unit (RC-10, Option)

When the remote control unit is connected, the microprocessor receives a High input at P123 and switches the following pin functions:

P03 →SI : Serial data input pin
P02 →SO : Serial data output pin
P01 →SCK : Serial clock input/output pin

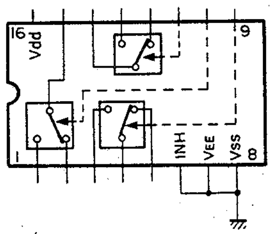
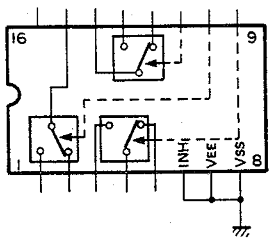
Data transfer between the microprocessor in the set and the microprocessor in the remote control unit takes place over these lines.

DESCRIPTION OF ELEMENTS

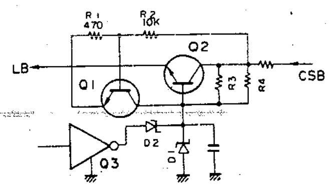
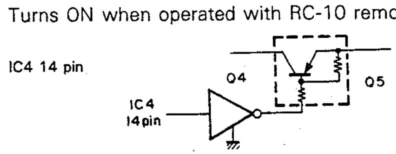
Final Unit (X45-3340-11:K,P, -21:M, -61:W)

Components	Use/Function	Operation/Condition/Compatibility
Q1	Power amplifier	144 MHz S-AV17:52 W or more (with APC set OFF)
Q2	Transmitter driver	144 MHz DO2 pin:0.12 W, Q2's collector:0.55 W (with APC OFF for S-AV17)
Q3	144 MHz protection, APC control	Power control with VR2, Protection adjustment wqith VR3
Q4	Power amplifier	430 MHz M57788:42 W or more (with APC OFF)
Q5	Drive stage + B control	
Q6	Low Power switch	Turns OFF when operating with 144 MHz Low Power
D1	Q2 idling	Anode voltage:0.6 V (in transmission)
D2, 3	Transmission/Reception select	UM940 for 144 MHz
D4	144 MHz APC, RF meter detection	RF meter adjustment with VR1, APC adjustment with VR2, 144 MHz
D5	144 MHz reflected wave detection	Adjust with VR3, 15 W:ANT is open
D7, 8	430 MHz APC, RF meter detection	UM401
D9	430 MHz APC, RF meter detection	Adjust with VR 7 on 430 MHz TX-RX unit, Adjust with VR 5 on 430 MHz TX-RX unit
D10	430 MHz reflected wave detection	Adjust VR4 on 430 MHz TX-RX unit
D11	Relay surge absorption	
D12	Power supply reverse connection protection	

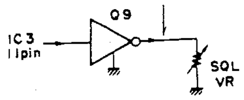
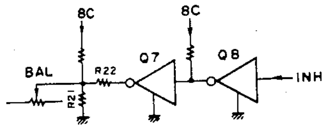
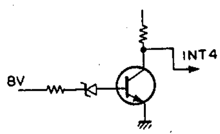
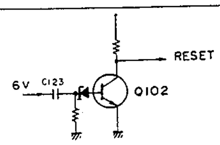
Control Unit (X53-3250-11:K,P, -21:M, -61:W)

Components	Use/Function	Operation/Condition/Compatibility
IC1	Electronic volume (IC5) select  CTCSS MAIN/SUB select	**In normal operation** ⑨ goes "L" level Between ③ and ④ turns OFF **Remote operated condition with RC-10** ⑨ goes "H" level. Between ③ and ④ turns ON **CTCSS MAIN/SUB select** MAIN: ⑩ goes "L" level. Between ② and ⑮ turns ON. SUB : ⑩ goes "H" level. Between ① and ⑮ turns ON.
IC2	Electronic volume (IC5) select 	**In normal operation** ⑨, ⑩, ⑪ goes "L" level. Between ② and ⑮ turns ON. between ③ and ④ turns OFF. Between ⑫ and ⑭ turns ON. between ① and ⑮ turns OFF. Between ⑬ and ⑭ turns OFF. **Remote operated condition with RC-10** ⑨, ⑩, ⑪ goes "H" level. Between ① and ⑮ turns ON. between ② and ⑮ turns OFF. Between ③ and ④ turns ON. between ⑬ and ⑭ turns ON. Between ⑫ and ⑭ turns OFF.

DESCRIPTION OF ELEMENTS

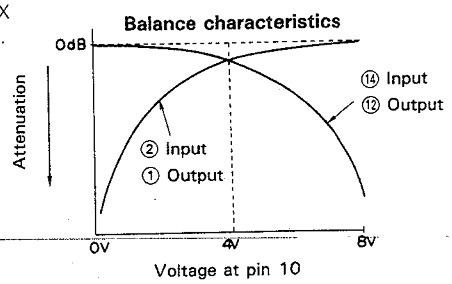
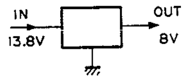
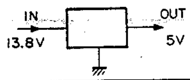
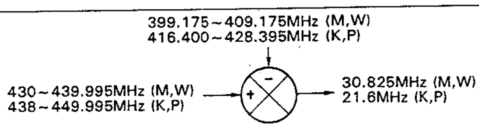
Components	Use/Function	Operation/Condition/Compatibility
IC3	Shift register	① Enable input ② Data input ③ Clock input ④ At high level in DIM mode ⑥ CTCSS MAIN/SUB select MAIN: ''L'' level ⑦ Band select output Goes low when main 430 MHz band ⑪ Squelch switch Goes high when squelch is turned OFF with RC-10 ⑫ Goes high when ⑭ mute output is activated ⑫ Goes high in memory scan, momentarily on transmission ⑬ Goes high when sub band CTCSS is ON ⑭ Goes high when MUTE key on the front panel is engaged
IC4	Shift register	① Enable input ② Data input ③ Clock input ⑥ Stops 430 MHz band 8R. Goes ''H'' on reception mode. ⑦ LOW power switch output. Goes ''L'' when LOW power is ON. ⑨ Data output to IC3 ⑪ Stops 144 MHz band 8R. Goes high on reception mode. ⑫ Electronic volume DOWN output Goes low in DOWN operation. ⑬ Electronic volume UP output Goes low in UP operation. ⑭ Electronic volume select output Goes high when electronic volume (IC2) is engaged
IC5	Electronic volume	③ 5 V ⑤ Sub input ⑧ Sub output ⑪ Main output ⑭ Main input ⑮ Initial terminal ''L'' level: volume step 6 ⑰ ''L'' level: volume down ⑲ ''L'' level: volume up
IC6	8 V AVR	Input: 13.8 V Output: 8 V
IC101	Microcomputer	refer to ''Circuit Description''
IC102	6V AVR	⑦ Input 8 V ② Output 6 V
IC103	DA conversion for tone	①—⑧ Input ⑬ Output
Q1	IR AVR protection	When AVR output is short-circuited 
Q2	LB AVR	
Q3	Dimmer switch	Turns ON when dimmer is engaged
Q4,5	Electronic volume select switch	Turns ON when operated with RC-10 remote control. 

DESCRIPTION OF ELEMENTS

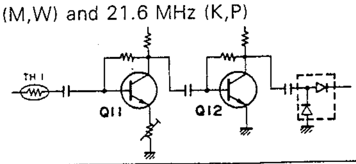
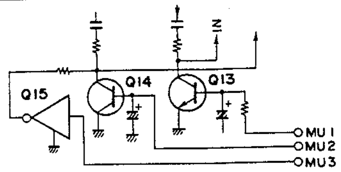
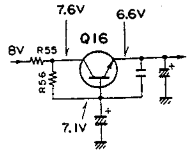
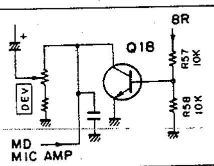
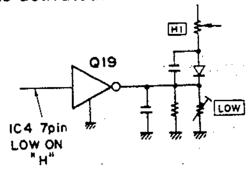
Components	Use/Function	Operation/Condition/Compatibility
Q6	Squelch OFF switch	Turns ON when squelch function is turned OFF with RC-10 
Q7	Balance volume switch	Turns ON in single operation
Q8	Balance volume switch	Turns OFF in single operation 
Q101	Backup switch	Turns OFF when the 8 V line shows below the rated value when the power is turned ON/OFF. 
Q102	Reset switch	Turns ON during 3 ms when the power is turned ON. Normally OFF. 
D1	LB AVR reference	11 V Zener diode
D2	LB AVR reference in dimmer mode	8.2 V Zener diode
D101	Reverse current protection lithium battery select	Lithium battery turns ON when the power is turned OFF.
D102	Reverse current protection, microcomputer protection	
D103	Reverse current protection	
D104	Microcomputer protection	
D105	Voltage drop	7 V Zener diode for back up switch circuit.

DESCRIPTION OF ELEMENTS

435 MHz Transmission/Reception Unit (X57-3390-11:K,P -21:M,W)

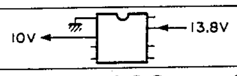
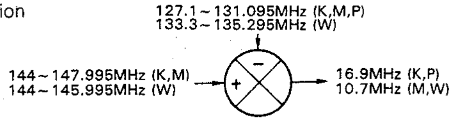
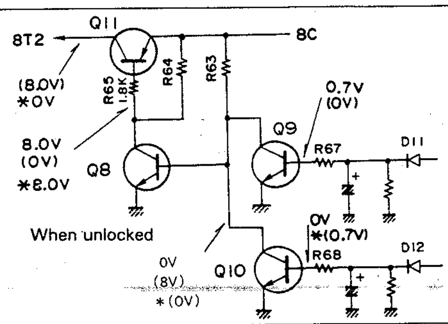
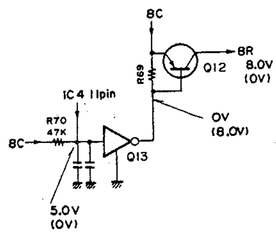
Components	Use/Function	Operation/Condition/Compatibility
IC3	2nd local oscillator, mixer IF amplifier, detector	Operation in reception ⑯ 2nd IF input 30.825 MHz (M,W), 2nd IF input 21.6 MHz (K,P) ①② 2nd local oscillator 30.37 MHz (M,W), 2nd local oscillator 21.145 MHz (K,P) ⑨ Detector output
IC4	Band select switch	③ At low level: Input → output → ③ At high level: Input → output →
IC5,7	IC5: Sub, IC7: Main Noise amplifier, detector, RD buffer	⑧ Detect signal input ⑨ SDT output ② Noise detect voltage output (DC)
IC6,8 IC6: Sub IC8: Main	SQL switch, AF amp	② At low level: AF output is ON low level ② At high level: AF output is OFF high level
IC9	Electronic volume balance	⑧ When 8 V: AF volume MAX 0 V: AF volume Min. 
IC10	8T, 8R select	③ high level, ② low level, ④ +8 V ③ low level, ② low level, ④ 0 V ③ high level, ② low level, ④ 0 V ③ low level, ② high level, ④ 0 V 8 R ⑨ high level, ⑧ 8 V ⑨ low level, ⑧ 0 V
IC11	APC	
IC12	8 V AVR	3 pin regulator 
IC13	5 V AVR	3 pin regulator 
Q1,2	Radio-frequency amplifier	Operation in reception
Q3	First mixer	Operation in correction 

DESCRIPTION OF ELEMENTS

Components	Use/Function	Operation/Condition/Compatibility
Q4	First IF amplifier	Operation in reception 30.825 MHz (M,W) and 21.6 MHz (K,P)
Q11,12	S-meter amplifier	
Q13	Main band mute	Main band mute when ON 
Q14	Sub band mute	Sub band mute when ON
Q15	Sub band mute	Sub band mute by 20 dB when ON
Q16	PLL 8 V ripple filter	
Q17	PLL output amplifier	On reception: 399.175—409.175 MHz (M,W), 416.400—428.395 MHz (K,M,P) On transmission: 430—440 MHz (M,W), 440—450 MHz (K,P)
Q18	PLL modulation input mute	On reception: When ON, turns C13 ON by 8R, and grounds the mic line. 
Q19	Low Power switch	430 MHz band: Turns OFF when LOW POWER is activated. 
Q20,21	Radio-frequency amplifier	Operation in reception 430—440 MHz, 440—450 MHz
Q22	Transmission driver	Operation in reception 430—440 MHz, 440—450 MHz
D1	430 MHz receive and transmit SW	Turns OFF on reception
D3	Reverse current protection	
D4	S-meter detection	
D5	PLL output switch	Turns ON on reception
D6	PLL output switch	Turns ON on transmission
D7	Reverse current protection	
D8	POWER control temperature compensation	
D9	Reverse current protection	
D10	Idling of Q16	
D11	Idling of Q17	
D12	Reverse current protection	

DESCRIPTION OF ELEMENTS

144 MHz Transmission/Reception Unit (X57-3400-11:K,P -21:M,W)

Components	Use/Function	Operation/Condition/Compatibility
IC1	Second local oscillator, mixer PLL 8 V ripple filter	Operation in reception ⑯ First IF input 10.7 MHz (M,W), 16.9 MHz (K,P) ①② Second local oscillator 10.240 MHz (M,W), 17.355 MHz (K,P) ⑨ Detector output
IC2	10 V AVR	
IC3	Speaker-separate select switch	② Sub output (non separate: output), ⑥⑦⑧ GND, ⑩⑪ separate select output (separate: "H" level) ⑫ Main output (non-separate: output), ⑬ Main output (separate: output), ⑭ Main input
IC4	AF amplifier	① AF input (only main when separate) ⑥ AF output (only main when separate) ⑦ 13.8 V ⑧ AF output (sub when separate, main and sub when non separate) ⑬ AF input (sub when separate, main and sub when non separate)
Q1	Radio-frequency amplifier	Operation in reception
Q2	First mixer	Operation in reception 
Q3	First IF amplifier	Operation in reception 10.7 MHz (M,W), 16.9 MHz (K,P)
Q4, 5	S-meter amplifier	
Q6	Main LPF	
~~Q7~~	~~Sub LPF~~	
Q8	8T switching control	Turns ON in transmission
Q9	8T switching control	Turns OFF in reception
Q10	8T switching control	PLL lock OFF
Q11	8T switching control	Turns ON in transmission 
Q12 Q13	8R switching 8R switching control	Turns ON in transmission Turns ON in reception 
Q14	Buffer	12.8 MHz
Q16	PLL modulation input mute	Turns ON in reception When receiving, turns Q16 ON, and grounds the mic line

DESCRIPTION OF ELEMENTS

Components	Use/Function	Operation/Condition/Compatibility
Q17	Phase locked loop voltage amplifier	
Q18	PLL output amplifier	On reception 127.1～131.095 MHz (K), 133.1～137.295 MHz (M), 133.3～135.295 MHz (T,W) On transmit 144～147.995 MHz (K), 144～145.995 MHz (M,T,W)
Q19, 20	Radio-frequency amplifier	Activates when transmitting
Q21	PLL reference oscillator	12.8 MHz
D1	Reverse current protection	
D4～8	Varicap tuning	
D9	Reverse current protection	
D10	S-meter detection	
D11,12	Reverse current protection	
D13	PLL output switch	
D14	Q20 idling	

144 MHz VCO unit (X58-3660-00) (M,W)
(X58-3670-10) (K,P)

Components	Use/Function	Operation/Condition/Compatibility
IC1	PLL	① VCO input When receiving: 127.1～131.095 MHz (K,M,P) 133.3～137.295 MHz (M) 133.3～135.295 MHz (W) When transmitting: 144～147.995 MHz (K,M,P) 144～145.995 MHz (W) ⑩ At low level when transmitting ⑭ At high level when unlocked ㉓ Reference oscillator input 12.8 MHz
Q1,2	LPF	
Q3	Transmission select switch	Turns ON at the moment when transmission starts
Q4	VCO output amplifier	When receiving: 127.1～131.095 MHz (K,M,P) 133.3～137.295 MHz (M) 133.3～135.295 MHz (W) When transmitting: 144～147.995 MHz (K,M,P) 144～145.995 MHz (W)
Q5	Transmission select switch	Turns OFF when transmit
Q101 (M,W) Q101 (K,P)	VCO (M,W) Receive VCO (K,P)	When receiving: 127.1～131.095 MHz (K,M,P) 133.3～137.295 MHz (M) 133.3～135.295 MHz (W) When transmitting: 144～147.995 MHz (K,M,P) 144～145.995 MHz (W)
Q102 (M,W) Q102 (K,P)	VCO output buffer (M,W) Receive VCO switch	When receiving: 127.1～131.095 MHz (K,M,P) 133.3～137.295 MHz (M) 133.3～135.295 MHz (W) When transmitting: 144～147.995 MHz (K,M,P) 144～145.995 MHz (W) Turns ON when receive (K,P)
Q103 (K,P)	Receive VCO output buffer	127.1～131.095 MHz (K,P)
Q104 (K,P)	Transmit VCO	144～147.995 MHz (K,P)
Q105 (K,P)	Transmit VCO switch	Turns ON when transmit
Q106 (K,P)	Transmit VCO output buffer	144～147.995 MHz (K,P)
D101	Varicap for transmission modulation	
D102	VCO voltage control	
D103 (K,P)	VCO voltage control	Transmit modulation varicap transmit
D104 (K,P)	VCO voltage control	Transmit modulation varicap transmit

DESCRIPTION OF ELEMENTS

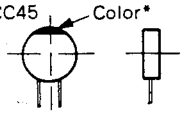
430 MHz VCO Unit (X58-3680-00)

Components	Use/Function	Operation/Condition/Compatibility
IC1	PLL	① VCO input When receiving 416.400～428.395 MHz (K,P) 399.175～409.170 MHz (M,W) When transmitting 440～449.995 MHz (K,P) 430～439.995 MHz (M,W) ⑩ At low level when transmitting ⑭ At high level when unlocked ㉓ Reference oscillator input 12.8 MHz
Q1～3	LPF	
Q4	Transmission select switch	Turns ON at the moment when transmission starts
Q5	VCO output buffer	When receiving 416.400～428.395 MHz (K,P) 399.175～409.170 MHz (M,W) When transmitting 440～449.995 MHz (K,P) 430～439.995 MHz (M,W)
Q6	Transmission select switch	Turns OFF when transmitting
Q101	VCO	When receiving 416.400～428.395 MHz (K,P) 399.175～409.170 MHz (M,W) When transmitting 440～449.995 MHz (K,P) 430～439.995 MHz (M,W)
Q102	VCO output buffer	When receiving 416.400～428.395 MHz (K,P) 399.175～409.170 MHz (M,W) When transmitting 440～449.995 MHz (K,P) 430～439.995 MHz (M,W)
Q103	Transmission select switch	Turns OFF during transmitting
D101, 102	VCO voltage control	
D103	Varicap for transmission modulation	

PARTS LIST

CAPACITORS CC 45 TH 1H 220 J
1 2 3 4 5 6

CC45 Color*



1 = Type ...... ceramic, electrolytic, etc.
2 = Shape ......round, square, etc.
3 = Temp. coefficient
4 = Voltage rating
5 = Value
6 = Tolerance

- **Capacitor value**

0 1 0 = 1pF
1 0 0 = 10pF
1 0 1 = 100pF
1 0 2 = 1000pF = 0.001μF
1 0 3 = 0.01μF

2 2 0 = 22pF
1st number | Multiplier
2nd number

- **Temperature Coefficient**

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	–80	–150	–220	–330	–470	–750

2nd Word	G	H	J	K	L
ppm/°C	± 30	± 60	± 120	± 250	± 500

Example CC45TH = –470±60 ppm/°C

- **Tolerance**

Code	C	D	G	J	K	M	X	Z	P	No code	
(%)	± 0.25	± 0.5	± 2	± 5	± 10	± 20	+ 40	+ 80	+ 100	More than	10μF–10~+50
							–20	–20	–0	Less than	4.7μF–10~+75

Less than 10 pF

Code	B	C	D	F	G
(pF)	± 0.1	± 0.25	± 0.5	± 1	± 2

- **Rating voltage**

1st word \ 2nd word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	–
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	–
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	–

- **Chip capacitors**

(EX) CC 73 F SL 1H 000 J → Refer to the table above.
1 2 3 4 5 6 7
(Chip) (CH,RH,UJ,SL)

(EX) CK 73 F F 1H 000 Z
1 2 3 4 5 6 7
(Chip) (B,F)

1 = Type ...... ceramic, electrolytic, etc.
2 = Shape ...... round, square, etc.
3 = Dimension
4 = Temp. coefficient
5 = Voltage rating
6 = Value
7 = Tolerance.

Dimension

Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25

RESISTORS

- **Chip resistor (Carbon)**

(EX) RD 73 E B 2B 000 J
1 2 3 4 5 6 7
(Chip) (B,F)

- **Carbon resistor (Normal type)**

RD 14 B B 2C 000 J
1 2 3 4 5 6 7

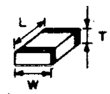
Dimension

Dimension code	L	W	T	Wattage
E	3.2 ± 0.2	1.6 ± 0.2	0.57	2B
F	2.0 ± 0.3	1.25 ± 0.2	0.45	2A

Rating wattage

Cord	Wattage	Cord	Wattage	Cord	Wattage
2A	1 /10W	2E	1/ 4W	3A	1W
2B	1/ 8W	2H	1/ 2W	3D	2W
2C	1/ 6W				

Dimension



DESCRIPTION OF ELEMENTS

SEMICONDUCTOR

N : New parts

Item	Remarks	Parts NO.
Diode		1SS101 1N60PSPA DSA3A1 RLS73 MI308 UM9401
Chip vari-cap diode	N	1T33C 1SV164
Chip diode		1SS128 1SS181 1SS184 1SS196 1SS226 1SS268 HSM88AS
Zenner diode		02CZ6.2(X, Y) 02CZ8.2Y 02CZ11Y 02CZ4.3(X, Y) 02CZ7.5(X)
Thermister		112-103-02 112-501-02
Transistor		2SC2538-22-A 2SC3326(A) 2SC3357 2SC3369 2SC3419(Y) 2SD1406(Y)
Chip TR		2SB1119S 2SC2407(1) 2SC2712(Y) 2SC2714(Y) 2SC2759(U23) 2SC2954 2SC3120 2SC3324(B) 2SC3369 FMW1

Item	Remarks	Parts NO.
Digital TR		DTA114EK DTA143EK DTC114EK DTC114TK DTC114EK DTC124EK
Chip FET		2SK125 2SK582 2SK208(O) 2SK179(L) 3SK184(S)
Power module		S-AV17 M57788M
IC		KCA01 KCA02 KCC01 KCE01 KCS01 KCS02 KRR-C001
	N	LA4446
		LA5006M LA5010M
	N	LC7534M
		M51523AL M54959FP MC3361D MN4066BS MN4094BS NJM4558M MC7808CT TC4053BF μPC78M08H
Microprossesor IC	N	75112GF-530-3BE

PARTS LIST

⁎ New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
				TM-731 A/E		
1	1B	*	A01-1076-02	METALLIC CABINET (TOP)		
2	3A		A01-1048-02	METALLIC CABINET (BOTTOM)		
		*	A10-1289-12	CHASSIS CALKED ASSY		
		*	A20-7017-02	PANEL ASSY TM-731A	KP	
		*	A20-7018-02	PANEL ASSY TM-731A	M	
		*	A20-7019-02	PANEL ASSY TM-731E	W	
4	2C	*	A20-7021-03	PANEL		
5	2B		A23-1499-04	REAR PANEL		
9	2C	*	B10-1122-03	FRONT GLASS	KP	
9	2C	*	B10-1123-03	FRONT GLASS	M	
9	2C	*	B10-1124-03	FRONT GLASS	W	
			B11-0451-04	FILTER (SMALL)		
			B11-0452-02	FILTER (LARGE)		
12	1E	*	B38-0317-05	LCD ASSY		
		*	B42-3370-04	LABEL (MAIN,SUB/MAIN)		
16	1G		B46-0410-20	WARRANTY CARD	K	
16	1G		B46-0419-00	WARRANTY CARD	W	
16	1G		B46-0422-00	WARRANTY CARD	P	
17	1G	*	B50-8295-00	INSTRUCTION MANUAL		
23	2F		E30-2111-05	DC CORD ASSY ACSY		
-			E31-3197-05	CONNECTING WIRE(2P SP)		
-			E31-3343-05	CONNECTING WIRE(TX-CONT)		
-			E31-3347-05	CONNECTING WIRE(2P DET)		
-			E31-3348-05	CONNECTING WIRE(2P SF)		
-		*	E31-6036-05	CONNECTING WIRE(4P)		
28	2F		F05-1531-05	FUSE (15A)		
-			F05-2036-05	FUSE (20A)		
31	1D		F15-0660-14	SHADE		
32	1D,1E		F15-0661-04	SHADE (SLIDE VOL)		
33	1F		F20-0521-04	INSULATING BOARD(LITHUM BATT)		
-			F20-1024-24	INSULATING BOARD(LCD FLAT KABL		
34	1D		F29-0431-05	INSULATOR (SUB ENCODER)		
38	2C		G02-0505-05	FLAT SPRING (AF VOL)		
-			G02-0520-04	FLAT SPRING (GND)		
39	2C		G09-0405-05	SPRING (MAIN SUB ENCODER)		
40	1A		G10-0651-04	FELT (SP)		
37	1A,3A	*	G10-0686-04	FELT (CABINET)		
-			G11-0623-04	SEAL		
-			G11-0624-04	SEAL		
-			G11-0625-04	SEAL		
-			G13-0649-04	CUSHION		
45	1D		G13-0868-04	CUSHION (3KEY)		
46	2D		G13-0869-04	CUSHION (10KEY)		
47	1D		G13-0870-04	CUSHION (UP,DOWN)		
-		*	G13-0928-04	CUSHION (LCD)		
-			G16-0526-04	TURNTABLE SHEET		
52	3G	*	H01-8258-04	ITEM CARTON BOX	K	
52	3G	*	H01-8259-04	ITEM CARTON BOX	M	
52	3G	*	H01-8260-04	ITEM CARTON BOX	W	
52	3G	*	H01-8281-04	ITEM CARTON BOX	P	
54	3F		H10-2642-02	POLYSTYRENE FOAMED FIXTURE		

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
55	1F		H12-1345-14	PACKING FIXTURE (TOP)		
-			H25-0029-04	PROTECTION BAG	KP	
56	2F		H25-0117-04	PROTECTION BAG (DC CORD)		
57	2C		H25-0706-04	PROTECTION BAG (RADIO)		
-			J20-0319-24	MIC HOOK (ASSY)	KP	
61	2D		J21-4226-04	MOUNTING HARDWARE(SUB PANEL)		
62	1A		J21-4232-04	MOUNTING HARDWARE(SP)		
63	1F		J29-0418-03	MOUNTING BLACKET		
64	2D		J31-0141-04	COLLAR (MIC JACK)		
68	2C		K27-3026-14	KNOB(BUTTON) (SLIDE VOL)		
69	2C		K27-3028-04	KNOB(BUTTON) (SLIDE SW)		
70	2C		K29-3060-04	KNOB ASSY (MAIN)		
71	1D		K29-3111-04	KNOB ASSY (CALL,VFO,MR/M)		
72	1D		K29-3112-04	KNOB ASSY (SCAN,SHIFT,TONE ETC		
73	2D		K29-3113-04	KNOB ASSY (DUAL)		
74	2C		K29-3114-04	KNOB ASSY (UP,DOWN)		
75	2C		K29-3115-04	KNOB ASSY (AF)		
76	2C		K29-3116-04	KNOB ASSY (SQ)		
77	1D		K29-3143-04	KNOB ASSY (F)		
78	2D		K29-3144-04	KNOB ASSY (LOW)		
79	2C		K29-3145-04	KNOB ASSY (SUB)		
A	2A,3A		N09-0666-05	SCREW (SUB PANEL CHASSIS)		
B	2A,2B		N09-2030-05	SCREW M4X6 HEATSINK		
C	1A		N09-2032-05	SCREW M2.6X4 SPEAKER ETC		
-			N09-2035-05	SCREW M2.6X4 REAR PANEL		
-			N32-2604-46	SCREW (PANEL)		
E	1E,2E		N32-2606-46	SCREW (MOUNTING HARDWARE)		
G	1D,1E		N35-2004-46	SCREW (DISPLAY)		
H	3A,3B		N35-3006-45	SCREW (CABINET)		
			N46-3010-46	TAPPING SCREW (MIC HOOK)	KP	
J	1A,1B		N87-2606-46	TAPPING SCREW (MOWNTING HARDWA		
K	2A		N87-2608-46	TAPPING SCREW (CONTROL UNIT)		
86	2F		N99-0318-05	SCREW SET (ACSY)		
R1			RD14BB2B2R2J	SOLID RESISTER 2.2K J 1/8W		
94	1A		T07-0246-05	LOUDSPEAKER(FULLRANGE)		
95	1F		T91-0379-15	MICROPHONE	M	
95	1F		T91-0380-15	MICROPHONE WITH DTMF	KP	
95	1F		T91-0382-15	MICROPHONE WITH TONE	W	
-			LC7582	IC(LCD DRIVER)		
-			W01-0414-04	WRENCH		
99	1E		W09-0326-05	LITHIUM BATTERY		
104	2B	*	X45-3340-11	FINAL UNIT	KP	
104	2B	*	X45-3340-21	FINAL UNIT	M	
104	2B	*	X45-3340-61	FINAL UNIT	W	
105	2A,1D	*	X53-3250-11	CONTROL UNIT	KP	
105	2A,1D	*	X53-3250-21	CONTROL UNIT	M	
105	2A,1D	*	X53-3250-61	CONTROL UNIT	W	
106	3A	*	X57-3390-11	TX-RX UNIT (440M)	KP	
106	3A	*	X57-3390-21	TX-RX UNIT (440M)	MW	
108	2A	*	X57-3400-11	TX-RX UNIT (144M)	KP	
108	2A	*	X57-3400-21	TX-RX UNIT (144M)	M	

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⋇ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
108	2A	*	X57-3400-61	TX-RX UNIT (144M)	W	
FINAL UNIT (X45-3340-XX) -11:KP, -21:M, -61:W						
			B42-3322-14	LABEL (144MHZ)		
C1			CK73FB1H102K	CHIP C 1000PF K		
C2			CC73FCH1H620J	CHIP C 62PF J		
C3			CC73FCH1H910J	CHIP C 91PF J		
C4			CK73FB1H102K	CHIP C 1000PF K		
C5			CK73FB1H102K	CHIP C 1000PF K		
C6			CC73FCH1H200J	CHIP C 20PF J		
C7			CE04CW1C100M	ELECTRO 10UF 16WV		
C8			CK73FB1H102K	CHIP C 1000PF K		
C9			CK73FB1H471K	CHIP C 470PF K		
C10 -12			CK73FB1H102K	CHIP C 1000PF K		
C13			CE04CW1C100M	ELECTRO 10UF 16WV		
C14			CE04CW1C100M	ELECTRO 10UF 16WV		
C15			CK73FB1H102K	CHIP C 1000PF K		
C16			CC45SL2H120J	CERAMIC 12PF J		
C17			CK73FB1H102K	CHIP C 1000PF K		
C18			CK73FB1H102K	CHIP C 1000PF K		
C19			CC45SL2H080D	CERAMIC 8.0PF D		
C20			CK45B2H102K	CERAMIC 1000PF K		
C21			CC45SL2H220J	CERAMIC 22PF J		
C22			CC73FCH1H180J	CHIP C 18PF J		
C23			CK73FB1H102K	CHIP C 1000PF K		
C24			CM73F2H470J	CHIP C 47PF J		
C25			CC73FCH1H0R5C	CHIP C 0.5PF C		
C26			CC45SL2H390J	CERAMIC 39PF J		
C27			CC73FCH1H010C	CHIP C 1.0PF C		
C28			CK73FB1H102K	CHIP C 1000PF K		
C29			CC45SL2H180J	CERAMIC 18PF J		
C30			CK73FB1H102K	CHIP C 1000PF K		
C31			CM73F2H050D	CHIP C 5.0PF D		
C32			CK73FB1H102K	CHIP C 1000PF K		
C34			CK73FB1H102K	CHIP C 1000PF K		
C35			CK73FB1H472K	CHIP C 4700PF K		
C36			CK73FB1H102K	CHIP C 1000PF K		
C37			CK73FB1H472K	CHIP C 4700PF K		
C38			CK73FB1H102K	CHIP C 1000PF K		
C39			CK73FB1H102K	CHIP C 1000PF K		
C40			CE04EW1C102M	ELECTRO 1000UF 16WV		
C41			CK73FB1H102K	CHIP C 1000PF K		
C42			CK73FB1H102K	CHIP C 1000PF K		
C43			CK73FB1H102K	CHIP C 1000PF K		
C44			CK73FB1H471K	CHIP C 470PF K		
C45			CE04CW1C100M	ELECTRO 10UF 16WV		
C46			CK73FB1H471K	CHIP C 470PF K		
C47			CK73FB1H471K	CHIP C 470PF K		
C48			CE04CW1C100M	ELECTRO 10UF 16WV		
C49			CM73F2H050D	CHIP C 5.0PF D		
C50			CC45SL2H030C	CERAMIC 3.0PF C		
C51			CC73FCH1H040C	CHIP C 4.0PF C		
C52			CC73FCH1H0R5C	CHIP C 0.5PF C		
C53			CC45SL2H050C	CERAMIC 5.0PF C		

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
C54			CC73FCH1H0R5C	CHIP C 0.5PF C		
C55			CM73F2H160J	CHIP C 16PF J		
C56			CC73FCH1H120J	CHIP C 12PF J		
C57			CM73F2H220J	CHIP C 22PF J		
C58			CC45SL2H080D	CERAMIC 8.0PF D		
C59			CM73F2H160J	CHIP C 16PF J		
C60			CC45SL2H050C	CERAMIC 5.0PF C		
C61			CC73FCH1H0R5C	CHIP C 0.5PF C		
C62		*	CM73F2H030D	CHIP C 3.0PF D		
C63			CK73FB1H471K	CHIP C 470PF K		
C64			CK73FB1H471K	CHIP C 470PF K		
C68			CK73FB1H471K	CHIP C 470PF K		
C69			CK73FB1H102K	CHIP C 1000PF K		
C70			CK73FB1H102K	CHIP C 1000PF K		
C71 -73			CK73FB1H471K	CHIP C 470PF K		
C75			CK73FB1H102J	CHIP C 1000PF J		
CN1			E40-3246-05	PIN CONNECTOR (2P)		
J1			E11-0408-05	PHONE JACK (MAIN+SUB)		
J2		*	E11-0435-05	PHONE JACK (SWITH)		
J3			E30-2105-05	ANT CABLE (M TYPE)		
J4			E30-2113-05	DC CORD (REAR PANEL)		
J5			E30-2106-05	ANT CABLE (N TYPE)	W	
J5			E30-2107-05	ANT CABLE (430MHZ WITH COVER)	KP	
TP1 -4			E23-0465-05	TERMINAL		
W1			E31-3350-05	CONNECTING WIRE		
W4			E23-0435-05	TERMINAL (FB)		
W5			E31-3353-05	CONNECTING WIRE(9P)		
W6		*	E31-6037-05	CONNECTING WIRE(7P)		
W7			E31-3351-05	CONNECTING WIRE(6P)		
W8			E31-2090-05	CONNECTING WIRE(DO)		
W9		*	E31-3349-25	CONNECTING WIRE(RA)		
A1		*	F01-0970-02	HEAT SINK		
A2		*	F11-1090-13	SHIELDING COVER(144MHZ SIDE)		
A3			F11-1091-03	SHIELDING COVER(430MHZ SIDE)		
F1			F05-1531-05	FUSE (15A)		
			G02-0576-14	FLAT SPRING (GND)		
A6		*	G13-0920-04	CUSHION (SP JACK)		
A5			J42-0453-05	BUSHING		
L1			L40-2272-80	SMALL FIXED INDUCTOR(22NH)		
L2			L40-1072-80	SMALL FIXED INDUCTOR(10NH)		
L3			L34-0895-05	COIL (6T)		
L4			L34-1017-05	COIL (3T)		
L5			L34-1039-05	COIL (1.5T)		
L6			L34-1238-05	COIL (9.5T)		
L7			L34-1153-05	COIL (7T)		
L8			L34-0742-05	COIL (5T)		
L9			L34-1238-05	COIL (9.5T)		
L10			L34-0499-05	COIL (4T)		
L11			L34-0499-05	COIL (4T)		
L12			L40-1092-16	SMALL FIXED INDUCTOR(1UH)		
L13			L34-1113-05	COIL (1.5T)		
L14			L34-0904-05	COIL (9.5T)		
L15			L34-1185-05	COIL (2.5T)		

E: Scandinavia & Europe K: USA P: Canada W: Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
L16			L34-1032-05	COIL (3.5T)		
L17			L34-1226-05	COIL (1.5T)		
L18			L34-1040-05	COIL (2T)		
L19			L40-1092-16	SMALL FIXED INDUCTOR(1UH)		
L21			L34-1163-05	COIL (9T)		
			N09-0626-04	SCREW (POWER MODULE)		
			N09-0650-05	SCREW (SHIELD COVER)		
			N87-2606-46	SCREW (PC BOARD)		
R1			RK73FB2A271J	CHIP R 270 J 1/10W		
R2			RK73FB2A180J	CHIP R 18 J 1/10W		
R3			RK73FB2A271J	CHIP R 270 J 1/10W		
R4			RK73FB2A470J	CHIP R 47 J 1/10W		
R5			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R6			R92-0685-05	CHIP R 22 J 1/2W		
R7			RK73FB2A471J	CHIP R 470 J 1/10W		
R8			RK73FB2A120J	CHIP R 12 J 1/10W		
R9			RK73FB2A471J	CHIP R 470 J 1/10W		
R10			RK73FB2A103J	CHIP R 10K J 1/10W		
R11			R92-1214-05	CHIP R 120 J 1 /2W		
R12			RK73FB2A270J	CHIP R 27 J 1/10W		
R13			RK73FB2A683J	CHIP R 68K J 1/10W		
R14			RK73FB2A223J	CHIP R 22K J 1/10W		
R16			RK73FB2A223J	CHIP R 22K J 1/10W		
R17			RK73FB2A333J	CHIP R 33K J 1/10W		
R19			RK73FB2A330J	CHIP R 33 J 1/10W		
R25			R92-1214-05	CHIP R 120 J 1 /2W		
R26			RK73FB2A334J	CHIP R 330K J 1/10W		
VR2			R12-6421-05	TRIMMING POT.(4.7K)		
VR3			R12-6427-05	TRIMMING POT.(47K)		
VR4		*	R12-6425-05	TRIMMING POT.(22K)		
D1			1SS184	DIODE		
D2			M1407	DIODE		
D3			MI308	DIODE		
D4			1SS101	DIODE		
D5			1SS184	DIODE		
D7			MI407	DIODE		
D8			MI308	DIODE		
D9			1SS101	DIODE		
D10			1SS101	DIODE		
D12			DSA3A1	DIODE		
Q1			S-AV17	IC(POWER MODULE FOR 144MHZ)		
Q2			2SC2538-22-A	TRANSISTOR		
Q3			FMW1	TRANSISTOR		
Q4			M57788M	IC(POWER MODULE/ 430-450MHZ)		
Q5			2SD1406(Y)	TRANSISTOR		
Q6			DTC114EK	DIGITAL TRANSISTOR		
TH1			112-503-2	THERMISTOR		
CONTROL UNIT (X53-3250-XX) -11:KP, -21:M, -61:W						
C1			CK73FB1H102K	CHIP C 1000PF K		
C2			CC73FSL1H101J	CHIP C 100PF J		
C3			CE04CW0J101M	ELECTRO 100UF 6.3WV		
C4			CK73FB1H102K	CHIP C 1000PF K		
C5			CK73EB1E104K	CHIP C 0.10UF K		

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
C6			CK73FB1H102K	CHIP C 1000PF K		
C7			CK73FB1H102K	CHIP C 1000PF K		
C8			C92-0004-05	CHIP TAN 1UF 16WV		
C9			CK73FB1H102K	CHIP C 1000PF K		
C10			CK73EB1E104K	CHIP C 0.10UF K		
C11			CK73FB1E223K	CHIP C 0.022UF K		
C12			CK73FB1H103K	CHIP C 0.010UF K		
C13			CE04CW1A101M	ELECTRO 100UF 10WV		
C14			CK73FB1H102K	CHIP C 1000PF K		
C101			CK73EF1C105Z	CHIP C 1.0UF Z		
C102			CK73FB1H103K	CHIP C 0.010UF K		
C103,104			CK73FB1H102K	CHIP C 1000PF K		
C105			CK73EF1C105Z	CHIP C 1.0UF Z		
C106			CK73FB1E223K	CHIP C 0.022UF K		
C107			CE04CW1A101M	ELECTRO 100UF 10WV		
C108-112			CK73FB1H102K	CHIP C 1000PF K		
C113			CK73FB1E223K	CHIP C 0.022UF K		
C114-117			CK73FB1H102K	CHIP C 1000PF K		
C118			CK73FB1H103K	CHIP C 0.010UF K		
C119			CK73FB1H103K	CHIP C 0.010UF K		
C120			CC73FCH1H330J	CHIP C 33PF J		
C121			CC73FCH1H330J	CHIP C 33PF J		
C122			CK73FB1H102K	CHIP C 1000PF K		
C123			CK73FB1E223K	CHIP C 0.022UF K		
C124			CK73FB1H102K	CHIP C 1000PF K		
CN1			E40-3264-05	PIN CONNECTOR (6P)		
CN2			E40-5154-05	PIN CONNECTOR (12P)		
CN3			E40-5154-05	PIN CONNECTOR (12P)		
CN4			E40-3263-05	PIN CONNECTOR (5P)		
CN101,102			E40-5154-05	PIN CONNECTOR (12P)		
J101			E06-0858-15	8P METAL SOCKET		
W1			E31-3354-05	CONNECTING WIRE(2P)		
W2			E31-3359-05	CONNECTING WIRE(3P)		
W3		*	E31-6031-05	CONNECTING WIRE(5P)		
W4			E31-3357-05	CONNECTING WIRE(5P)		
W5		*	E31-6032-05	CONNECTING WIRE(6P)		
W6			E31-3359-05	CONNECTING WIRE(3P)		
W7			E31-3360-05	CONNECTING WIRE(CTCSS)		
W8		*	E31-6033-05	CONNECTING WIRE(7P)		
W9		*	E31-6034-05	CONNECTING WIRE(8P)		
W101			E31-3361-05	CONNECTING WIRE(5P)		
W201			E31-3362-05	CONNECTING WIRE(6P)		
X101			L77-1333-05	CRYSTAL RESONATOR(4.194304MHZ)		
R1			RK73FB2A471J	CHIP R 470 J 1/10W		
R2			RK73FB2A103J	CHIP R 10K J 1/10W		
R3			RK73EB2B102J	CHIP R 1.0K J 1/8W		
R4			RK73EB2B102J	CHIP R 1.0K J 1/8W		
R5			R92-0670-05	CHIP R 0 OHM	W	
R5			R92-0670-05	CHIP R 0 OHM	M	
R5			R92-0670-05	CHIP R 0 OHM	KP	
R6			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R7			RK73FB2A332J	CHIP R 3.3K J 1/10W		

E: Scandinavia & Europe K: USA P: Canada W: Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R8			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R9			RK73FB2A473J	CHIP R 47K J 1/10W		
R10 ,11			RK73FB2A104J	CHIP R 100K J 1/10W		
R12			R92-0670-05	CHIP R 0 OHM	W	
R12			R92-0670-05	CHIP R 0 OHM	M	
R12			R92-0670-05	CHIP R 0 OHM	KP	
R13			RK73FB2A104J	CHIP R 100K J 1/10W		
R14 ,15			R92-0670-05	CHIP R 0 OHM	W	
R14 ,15			R92-0670-05	CHIP R 0 OHM	M	
R14 ,15			R92-0670-05	CHIP R 0 OHM	KP	
R16 -19			R92-0679-05	CHIP R 0 OHM		
R20			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R21			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R22			RK73FB2A561J	CHIP R 560 J 1/10W		
R23			RK73FB2A103J	CHIP R 10K J 1/10W		
R24			R92-0670-05	CHIP R 0 OHM	W	
R24			R92-0670-05	CHIP R 0 OHM	M	
R24			R92-0670-05	CHIP R 0 OHM	KP	
R25 ,26			R92-0150-05	JUMPER REST 0 OHM		
R27			R92-0670-05	CHIP R 0 OHM	W	
R27			R92-0670-05	CHIP R 0 OHM	M	
R27			R92-0670-05	CHIP R 0 OHM	KP	
R28			R92-0679-05	CHIP R 0 OHM		
R29			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R30			RK73FB2A223J	CHIP R 22K J 1/10W		
R31			RK73FB2A223J	CHIP R 22K J 1/10W		
R101			RK73FB2A474J	CHIP R 470K J 1/10W		
R102			RK73FB2A563J	CHIP R 56K J 1/10W		
R103			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R104			RK73FB2A474J	CHIP R 470K J 1/10W		
R105			RK73FB2A473J	CHIP R 47K J 1/10W		
R106			RK73FB2A561J	CHIP R 560 J 1/10W		
R107			RK73FB2A561J	CHIP R 560 J 1/10W		
R108-117			RK73FB2A473J	CHIP R 47K J 1/10W		
R118			R92-0670-05	CHIP R 0 OHM	W	
R118			R92-0670-05	CHIP R 0 OHM	M	
R118			R92-0670-05	CHIP R 0 OHM	KP	
R119,120			RK73FB2A473J	CHIP R 47K J 1/10W		
R121-123			R92-0670-05	CHIP R 0 OHM	W	
R121-125			R92-0670-05	CHIP R 0 OHM	M	
R121,122			R92-0670-05	CHIP R 0 OHM	KP	
R124			R92-0670-05	CHIP R 0 OHM	KP	
R125			R92-0670-05	CHIP R 0 OHM	W	
R126			R92-0679-05	CHIP R 0 OHM		
R127			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R128			RK73FB2A473J	CHIP R 47K J 1/10W		
R129-131			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R132-136			RK73FB2A473J	CHIP R 47K J 1/10W		
R137			RK73FB2A473J	CHIP R 47K J 1/10W		
R138,139			R92-0670-05	CHIP R 0 OHM	W	
R138,139			R92-0670-05	CHIP R 0 OHM	M	
R138,139			R92-0670-05	CHIP R 0 OHM	KP	
R140			RK73FB2A103J	CHIP R 10K J 1/10W		
VR101			R13-4403-05	SLIDE TYPE POT(50K CENTER CLIK		
VR102			R13-4402-05	SLIDE TYPE POT(50K-B SUB SQ)		

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
VR201			R23-9405-05	POTENTIOMETER(50K POWER,AF,ETC		
S101-115			S40-1086-05	TACT SWITCH		
S116			S31-1409-05	SLIDE SWITCH (LOCK SW)		
D1			02CZ11Y	ZENER DIODE (11V)		
D2			02CZ8.2Y	ZENER DIODE (8.2V)		
D101,102			1SS184	DIODE		
D103			RLS73	DIODE		
D104			1SS184	DIODE		
D105			02CZ7.5(X)	ZENER DIODE (7.5V)		
IC1 ,2		*	TC4053BF	IC(3-INPUT 2CH MPX/DE-MPX)		
IC3 ,4			MN4094BS	IC(8BIT SHIFT,STORE BUS R)		
IC5		*	LC7534M	IC(ELECT. VOL)		
IC6			MC7808CT	IC(VOLTAGE REGULATORS/ +8V)		
IC103		*	R90-0711-05	RESISTOR BLOCK		
IC101		*	75112GF-530-3BE	IC(LOW SATURATION REGULATOR)		
IC102			LA5006M	IC(LOW SATURATION REGULATOR)		
Q1			2SC2712(Y)	TRANSISTOR		
Q2			2SC3419(Y)	TRANSISTOR		
Q3 ,4			DTC114EK	DIGITAL TRANSISTOR		
Q5			DTA114EK	DIGITAL TRANSISTOR		
Q6 -8			DTC114EK	DIGITAL TRANSISTOR		
Q101,102			2SC2712(Y)	TRANSISTOR		
S117			W02-0388-05	MAIN ENCODER		
S118		*	W02-0851-05	SUB ENCODER		
440 MHz TX-RX UNIT (X57-3390-XX) -11:KP, -21:MW						
C1			CC73FCH1H030C	CHIP C 3.0PF C	MW	
C1			CC73FCH1H030C	CHIP C 3.0PF C	KP	
C3			CC73FCH1H020C	CHIP C 2.0PF C	KP	
C3			CC73FCH1H040C	CHIP C 4.0PF C	MW	
C4 -7			CK73FB1H102K	CHIP C 1000PF K	KP	
C4 -7			CK73FB1H102K	CHIP C 1000PF K	MW	
C8			CC73FCH1H1R5C	CHIP C 1.5PF C		
C9			CC73FCH1H390J	CHIP C 39PF J	KP	
C9			CC73FCH1H390J	CHIP C 39PF J	MW	
C10 ,11			CK73FB1H102K	CHIP C 1000PF K	KP	
C10 ,11			CK73FB1H102K	CHIP C 1000PF K	MW	
C12			CC73FCH1HR75C	CHIP C 0.75PF C	KP	
C13			CC73FCH1H330J	CHIP C 33PF J	KP	
C13			CC73FCH1H330J	CHIP C 33PF J	MW	
C14			CK73FB1H471K	CHIP C 470PF K	MW	
C14			CK73FB1H471K	CHIP C 470PF K	KP	
C15			CK73FB1E223K	CHIP C 0.022UF K		
C16			CK73FB1H471K	CHIP C 470PF K	MW	
C16			CK73FB1H471K	CHIP C 470PF K	KP	
C17			CC73FCH1H030C	CHIP C 3.0PF C	KP	
C17			CC73FCH1H050C	CHIP C 5.0PF C	MW	
C18 ,19			CK73FB1H102K	CHIP C 1000PF K	KP	
C18 ,19			CK73FB1H102K	CHIP C 1000PF K	MW	
C20			CE04EW1A221M	ELECTRO 220UF 10WV		
C21			CC73FCH1H060D	CHIP C 6.0PF D	MW	
C21			CC73FCH1H100D	CHIP C 10PF D	KP	
C22			CC73FSL1H101J	CHIP C 100PF J		
C23 -25			CK73FB1H102K	CHIP C 1000PF K	KP	
C23 -25			CK73FB1H102K	CHIP C 1000PF K	MW	

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格			Desti-nation 仕向	Re-marks 備考
C26			CC73FCH1H100D	CHIP C	10PF	D	MW	
C26			CC73FCH1H330J	CHIP C	33PF	J	KP	
C27			CK73FB1H102K	CHIP C	1000PF	K	KP	
C27			CK73FB1H102K	CHIP C	1000PF	K	MW	
C28			CC73FCH1H330J	CHIP C	33PF	J	KP	
C28			CC73FCH1H390J	CHIP C	39PF	J	MW	
C29			CK73FB1E223K	CHIP C	0.022UF	K		
C30 -32			CK73EB1E104K	CHIP C	0.10UF	K		
C33			CK73FB1H102K	CHIP C	1000PF	K	KP	
C33			CK73FB1H102K	CHIP C	1000PF	K	MW	
C34			CE04EW1A470M	ELECTRO	47UF	10WV		
C35 ,36			CK73FB1E103K	CHIP C	0.010UF	K		
C37			CK73EB1E104K	CHIP C	0.10UF	K		
C38			CK73FB1E103K	CHIP C	0.010UF	K		
C39			CC73FCH1H100D	CHIP C	10PF	D	KP	
C39			CC73FCH1H100D	CHIP C	10PF	D	MW	
C40			CK73EF1E474Z	CHIP C	0.47UF	Z		
C41			CK73FB1H102K	CHIP C	1000PF	K	KP	
C41			CK73FB1H102K	CHIP C	1000PF	K	MW	
C42			CE04EW1A470M	ELECTRO	47UF	10WV		
C43			CK73FB1H102K	CHIP C	1000PF	K	KP	
C43			CK73FB1H102K	CHIP C	1000PF	K	MW	
C44 ,45			CE04EW1A470M	ELECTRO	47UF	10WV		
C46			CK73EB1E104K	CHIP C	0.10UF	K		
C47			CE04EW1A470M	ELECTRO	47UF	10WV		
C48			C92-0005-05	CHIP-TAN	2.2UF	6.3WV		
C49 ,50			CK73FB1H102K	CHIP C	1000PF	K	KP	
C49 ,50			CK73FB1H102K	CHIP C	1000PF	K	MW	
C51			CK73EB1E104K	CHIP C	0.10UF	K		
C52			CE04EW1A470M	ELECTRO	47UF	10WV		
C53			C92-0005-05	CHIP-TAN	2.2UF	6.3WV		
C54 -56			CK73FB1H102K	CHIP C	1000PF	K	KP	
C54 -56			CK73FB1H102K	CHIP C	1000PF	K	MW	
C57			CK73EB1E104K	CHIP C	0.10UF	K		
C58			CE04EW1A220M	ELECTRO	22UF	10WV		
C59			CE04EW1A101M	ELECTRO	100UF	10WV		
C60			CK73FB1H102K	CHIP C	1000PF	K	KP	
C60			CK73FB1H102K	CHIP C	1000PF	K	MW	
C61			CE04EW1A220M	ELECTRO	22UF	10WV		
C62 ,63			CK73EB1H223K	CHIP C	0.022UF	K		
C64 ,65			CK73EF1C105Z	CHIP C	1.0UF	Z		
C66 -68			CK73FB1H102K	CHIP C	1000PF	K	KP	
C66 -68			CK73FB1H102K	CHIP C	1000PF	K	MW	
C69			CK73EF1C105Z	CHIP C	1.0UF	Z		
C70 ,71			CK73FB1E103K	CHIP C	0.010UF	K		
C72			CE04EW1A470M	ELECTRO	47UF	10WV		
C73			CK73EF1C105Z	CHIP C	1.0UF	Z		
C74			CK73FB1H102K	CHIP C	1000PF	K	KP	
C74			CK73FB1H102K	CHIP C	1000PF	K	MW	
C75 ,76			CK73FB1E223K	CHIP C	0.022UF	K		
C77			CE04EW1A470M	ELECTRO	47UF	10WV		
C78			CE04EW1H2R2M	ELECTRO	2.2UF	50WV		
C79			CE04EW1A221M	ELECTRO	220UF	10WV		
C80			CK73FB1H102K	CHIP C	1000PF	K	KP	
C80			CK73FB1H102K	CHIP C	1000PF	K	MW	

E: Scandinavia & Europe K: USA P: Canada W: Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⋇ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
C81			CE04EW1A221M	ELECTRO 220UF 10WV		
C82			CK73FB1E103K	CHIP C 0.010UF K		
C83			CK73FB1H102K	CHIP C 1000PF K	KP	
C83			CK73FB1H102K	CHIP C 1000PF K	MW	
C84			CK73EF1C105Z	CHIP C 1.0UF Z		
C85			CK73FB1H102K	CHIP C 1000PF K	KP	
C85			CK73FB1H102K	CHIP C 1000PF K	MW	
C86 -88			CC73FSL1H101J	CHIP C 100PF J		
C89 ,90			CK73FB1H102K	CHIP C 1000PF K	KP	
C89 ,90			CK73FB1H102K	CHIP C 1000PF K	MW	
C91			CC73FCH1H030C	CHIP C 3.0PF C	MW	
C91			CC73FCH1H030C	CHIP C 3.0PF C	KP	
C92 ,93			CK73FB1H102K	CHIP C 1000PF K	KP	
C92 ,93			CK73FB1H102K	CHIP C 1000PF K	MW	
C94			CC73FCH1H050C	CHIP C 5.0PF C	KP	
C94			CC73FCH1H050C	CHIP C 5.0PF C	MW	
C95			CK73FB1H102K	CHIP C 1000PF K	KP	
C95			CK73FB1H102K	CHIP C 1000PF K	MW	
C96 ,97			C92-0504-05	CHIP-TAN 0.68UF 20WV		
C98 -104			CK73FB1H102K	CHIP C 1000PF K	KP	
C98 -104			CK73FB1H102K	CHIP C 1000PF K	MW	
C105			CE04CW1A470M	ELECTRO 47UF 10WV		
C106-121			CK73FB1H102K	CHIP C 1000PF K	KP	
C106-121			CK73FB1H102K	CHIP C 1000PF K	MW	
C122			CE04EW1C101M	ELECTRO 100UF 16WV		
C123			C90-2040-05	ELECTRO 10UF 16WV		
C124			CE04EW1C100M	ELECTRO 10UF 16WV		
C125-127			CK73FB1H471K	CHIP C 470PF K	MW	
C125-127			CK73FB1H471K	CHIP C 470PF K	KP	
C128			CC73FCH1H050C	CHIP C 5.0PF C	KP	
C128			CC73FCH1H050C	CHIP C 5.0PF C	MW	
C129-132			CK73FB1H471K	CHIP C 470PF K	MW	
C129-132			CK73FB1H471K	CHIP C 470PF K	KP	
C133			CC73FCH1H180J	CHIP C 18PF J		
C134			CC73FCH1H030C	CHIP C 3.0PF C	MW	
C134			CC73FCH1H030C	CHIP C 3.0PF C	KP	
C135			CC73FCH1H220J	CHIP C 22PF J	MW	
C135			CK73FB1H471K	CHIP C 470PF K	KP	
C136			CC73FCH1H100D	CHIP C 10PF D	MW	
C137,138			CK73FB1H471K	CHIP C 470PF K	MW	
C137,138			CK73FB1H471K	CHIP C 470PF K	KP	
C139			CE04EW1C100M	ELECTRO 10UF 16WV		
C140			CK73FB1H471K	CHIP C 470PF K	MW	
C140			CK73FB1H471K	CHIP C 470PF K	KP	
C141			CK73FB1H102K	CHIP C 1000PF K	MW	
C141,142			CK73FB1H102K	CHIP C 1000PF K	KP	
TC1 ,2			C05-0346-05	TRIMMING CAP		
CN1			E04-0157-05	COAX. PIN JACK RA		
CN2			E40-3246-05	PIN CONNECTOR(2P)		
CN3			E40-3249-05	PIN CONNECTOR(5P)		
CN4			E40-3252-05	PIN CONNECTOR(8P)		
CN5 ,6			E40-3247-05	PIN CONNECTOR(3P)		
CN7			E40-3246-05	PIN CONNECTOR(2P)		
CN8			E04-0157-05	COAX. PIN JACK DO		

E: Scandinavia & Europe K: USA P: Canada W: Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

⚠ *indicates safety critical components.*

PARTS LIST

⁎ New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
CN9			E40-3251-05	PIN CONNECTOR(7P)		
CN10			E40-3249-05	PIN CONNECTOR(5P)		
CN11			E40-3250-05	PIN CONNECTOR(6P)		
CN12			E40-3248-05	PIN CONNECTOR(4P)		
TP1			E40-0211-05	PIN CONNECTOR		
TP2			E23-0465-05	TERMINAL		
CF1			L72-0315-05	CERAMIC FILTER(CFW455F)		
L1			L40-1872-80	SMALL FIXED INDUCTOR(18NH)		
L2			L40-1072-80	SMALL FIXED INDUCTOR(10NH)		
L3 ,4			L79-0690-05	HELICAL BLOCK		
L6			L40-1872-80	SMALL FIXED INDUCTOR(18NH)	KP	
L7			L40-3972-80	SMALL FIXED INDUCTOR(39NH)		
L8			L34-2157-05	IFT (30.825MHZ)	MW	
L8 ,9			L30-0508-05	IFT (21.6MHZ)	KP	
L9			L34-2045-05	IFT (30.825MHZ)	MW	
L10			L40-1092-81	SMALL FIXED INDUCTOR(1UH)	MW	
L11			L34-4015-05	COIL (455KHZ)		
L12			L40-2272-80	SMALL FIXED INDUCTOR(22NH)		
L13			L40-3372-80	SMALL FIXED INDUCTOR(33NH)		
L14 -16			L40-1072-80	SMALL FIXED INDUCTOR(10NH)		
L17			L34-1058-05	COIL (2.5T)		
L18			L34-1079-05	COIL (1.5T)	MW	
X1			L77-0997-05	CRYSTAL RESONATOR(21.145MHZ)	KP	
X1			L77-1312-05	CRYSTAL RESONATOR(30.37MHZ)	MW	
XF1			L71-0227-05	MCF (21.6MHZ)	KP	
XF1			L71-0270-05	MCF (30.825MHZ)	MW	
R1			RK73FB2A101J	CHIP R 100 J 1/10W		
R2			RK73FB2A333J	CHIP R 33K J 1/10W		
R3			RK73FB2A104J	CHIP R 100K J 1/10W		
R4			RK73FB2A101J	CHIP R 100 J 1/10W		
R5			RK73FB2A470J	CHIP R 47 J 1/10W		
R6			RK73FB2A270J	CHIP R 27 J 1/10W		
R7			RK73FB2A471J	CHIP R 470 J 1/10W		
R8			R92-0670-05	CHIP R 0 OHM		
R9			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R10			RK73FB2A223J	CHIP R 22K J 1/10W		
R13			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R14			RK73FB2A470J	CHIP R 47 J 1/10W		
R15			R92-0670-05	CHIP R 0 OHM		
R16			RK73FB2A182J	CHIP R 1.8K J 1/10W	KP	
R16			RK73FB2A222J	CHIP R 2.2K J 1/10W	MW	
R17			RK73FB2A334J	CHIP R 330K J 1/10W		
R18			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R19			RK73FB2A683J	CHIP R 68K J 1/10W		
R20			RK73FB2A103J	CHIP R 10K J 1/10W	MW	
R21			RK73FB2A333J	CHIP R 33K J 1/10W		
R22			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R23			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R24			RK73FB2A334J	CHIP R 330K J 1/10W		
R25			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R26			RK73FB2A334J	CHIP R 330K J 1/10W		
R27			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R28			RK73FB2A471J	CHIP R 470 J 1/10W		
R29			RK73FB2A103J	CHIP R 10K J 1/10W	MW	

E: Scandinavia & Europe K: USA P: Canada W: Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R29			RK73FB2A103J	CHIP R 10K J 1/10W	KP	
R30			RK73FB2A681J	CHIP R 680 J 1/10W		
R31			RK73FB2A471J	CHIP R 470 J 1/10W		
R32			RK73FB2A390J	CHIP R 39 J 1/10W		
R33			RK73FB2A471J	CHIP R 470 J 1/10W		
R34			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R35			R92-0670-05	CHIP R 0 OHM		
R36			RK73FB2A390J	CHIP R 39 J 1/10W		
R37			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R38			RK73FB2A221J	CHIP R 220 J 1/10W	MW	
R38			RK73FB2A221J	CHIP R 220 J 1/10W	KP	
R40 ,41			RK73FB2A222J	CHIP R 2.2K J 1/10W	KP	
R40 ,41			RK73FB2A222J	CHIP R 2.2K J 1/10W	MW	
R42			RK73FB2A391J	CHIP R 390 J 1/10W		
R43 -46			RK73FB2A223J	CHIP R 22K J 1/10W		
R47			RK73FB2A270J	CHIP R 27 J 1/10W		
R48			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R49			RK73FB2A473J	CHIP R 47K J 1/10W		
R50			RK73FB2A223J	CHIP R 22K J 1/10W		
R51			RK73FB2A103J	CHIP R 10K J 1/10W	MW	
R51			RK73FB2A103J	CHIP R 10K J 1/10W	KP	
R52 ,53			RK73FB2A101J	CHIP R 100 J 1/10W		
R54			RK73FB2A222J	CHIP R 2.2K J 1/10W	KP	
R54			RK73FB2A222J	CHIP R 2.2K J 1/10W	MW	
R55 ,56			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R57			RK73FB2A103J	CHIP R 10K J 1/10W	MW	
R57			RK73FB2A103J	CHIP R 10K J 1/10W	KP	
R58			RK73FB2A473J	CHIP R 47K J 1/10W		
R59			RK73FB2A393J	CHIP R 39K J 1/10W		
R60			RK73FB2A473J	CHIP R 47K J 1/10W		
R62 ,63			R92-0679-05	CHIP R 0 OHM		
R64			RK73FB2A104J	CHIP R 100K J 1/10W		
R65			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R66			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R67			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R68			RK73FB2A470J	CHIP R 47 J 1/10W		
R69			RK73FB2A101J	CHIP R 100 J 1/10W		
R70			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R71			RK73FB2A470J	CHIP R 47 J 1/10W		
R72			RK73FB2A100J	CHIP R 10 J 1/10W		
R73			RK73FB2A151J	CHIP R 150 J 1/10W	KP	
R73			RK73FB2A151J	CHIP R 150 J 1/10W	MW	
R74			RK73FB2A390J	CHIP R 39 J 1/10W		
R75			RK73FB2A151J	CHIP R 150 J 1/10W	KP	
R75			RK73FB2A151J	CHIP R 150 J 1/10W	MW	
R76			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R77			RK73FB2A151J	CHIP R 150 J 1/10W	KP	
R77			RK73FB2A221J	CHIP R 220 J 1/10W	MW	
R78			R92-0685-05	CHIP R 22 J 1/2W		
R79 ,80			R92-0670-05	CHIP R 0 OHM		
R83			RK73FB2A221J	CHIP R 220 J 1/10W	MW	
R83			RK73FB2A221J	CHIP R 220 J 1/10W	KP	
R84 ,85			R92-0670-05	CHIP R 0 OHM		
VR1			R12-6431-05	TRIMMING POT.(220K)		
VR2		*	R12-6415-05	TRIMMING POT.(470K)		

E: Scandinavia & Europe K: USA P: Canada W: Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
VR3		*	R12-6429-05	TRIMMING POT.(100K)		
VR4			R12-6427-05	TRIMMING POT.(47K)		
VR5			R12-6421-05	TRIMMING POT.(4.7K)		
VR7			R12-6423-05	TRIMMING POT.(10K)		
			NJM78M05A	IC(5V AVR)		
D1			HSK277	CHIP DIODE		
D3			1SS184	CHIP DIODE		
D4			HSM88AS	CHIP DIODE		
D5 ,6			1SV128	CHIP DIODE		
D7			1SS184	CHIP DIODE		
D8			1SS181	CHIP DIODE		
D9			1SS184	CHIP DIODE		
D10 ,11			1SS181	CHIP DIODE		
D12			1SS184	CHIP DIODE		
IC3			MC3361D	IC(FM IF SYSTEM)		
IC4			KCS02	IC(BAND SW)		
IC5			KCA01	IC(NOISE AMP)		
IC6			KCA02	IC(AF AMP)		
IC7			KCA01	IC(NOISE AMP)		
IC8			KCA02	IC(AF AMP)		
IC9			M51523AL	IC(2H ELECTRIC VOLUME)		
IC10			KCS01	IC(TR SW)		
IC11			KCC01	IC(APC)		
IC12			NJM78L08UA	IC(VOLTAGE REGULATOR/ +8V)		
Q1			3SK184(S)	CHIP FET		
Q2			2SK125	CHIP FET		
Q3			3SK184(S)	CHIP FET		
Q4			2SC2714(Y)	CHIP TRANSISTOR		
Q11 ,12			2SC2712(Y)	CHIP TRANSISTOR		
Q13 ,14			2SD1757(K)	CHIP TRANSISTOR		
Q15			DTC114EK	CHIP DISITAL TRANSISTOR		
Q16			2SC2712(Y)	CHIP TRANSISTOR		
Q17			2SC2759(U23)	CHIP TRANSISTOR		
Q18 ,19			DTC114EK	CHIP DISITAL TRANSISTOR		
Q20			2SC2759(U23)	CHIP TRANSISTOR		
Q21			2SC3357	CHIP TRANSISTOR		
Q22			2SC3369	CHIP TRANSISTOR		
TH1			112-501-2	THERMISTOR (500 OHM)		
		*	X58-3680-00	SUB UNIT (430 PLL)		
144 MHz TX-RX UNIT (X57-3400-XX) -11:KP, -21:M, -61:W						
C6			CC73FSL1H470J	CHIP C 47PF J		
C7			CC73FCH1H120J	CHIP C 12PF J		
C8			CK73FB1H102K	CHIP C 1000PF K		
C9			CK73FB1H102K	CHIP C 1000PF K		
C10			CK73FB1E103K	CHIP C 0.010UF K		
C11			CK73FB1H102K	CHIP C 1000PF K		
C12			CC73FSL1H470J	CHIP C 47PF J		
C13			CK73FB1E103K	CHIP C 0.010UF K		
C14			CC73FCH1H0R5C	CHIP C 0.5PF C		
C15			CC73FSL1H470J	CHIP C 47PF J		
C16			CC73FCH1H0R5C	CHIP C 0.5PF C		
C17			CC73FSL1H680J	CHIP C 68PF J		
C18			CK73FB1E103K	CHIP C 0.010UF K		
C19			CC73FCH1H040C	CHIP C 4.0PF C	KP	

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格			Desti-nation 仕向	Re-marks 備考
C19			CC73FCH1H150J	CHIP C	15PF	J	M	
C20			CC73FCH1H030C	CHIP C	3.0PF	C		
C21			CK73FB1H102K	CHIP C	1000PF	K		
C22			CK73FB1H102K	CHIP C	1000PF	K		
C23			CK73FB1E103K	CHIP C	0.010UF	K		
C24			CC73FCH1H050C	CHIP C	5.0PF	C	M	
C24			CC73FCH1H070D	CHIP C	7.0PF	D	KP	
C25			CC73FSL1H101J	CHIP C	100PF	J	KP	
C25			CC73FSL1H101J	CHIP C	100PF	J	M	
C26 -28			CK73FB1H102K	CHIP C	1000PF	K		
C29			CC73FSL1H101J	CHIP C	100PF	J	KP	
C29			CC73FSL1H390J	CHIP C	39PF	J	M	
C30			CC73FSL1H101J	CHIP C	100PF	J	M	
C30			CC73FSL1H560J	CHIP C	56PF	J	KP	
C31 ,32			CK73EB1E104K	CHIP C	0.10UF	K		
C33			CK73FB1H102K	CHIP C	1000PF	K		
C34			CK73EB1E104K	CHIP C	0.10UF	K		
C35			CK73FB1E223K	CHIP C	0.022UF	K		
C36 -38			CK73FB1E103K	CHIP C	0.010UF	K		
C39			CC73FCH1H100D	CHIP C	10PF	D		
C40			CE04CW1A470M	ELECTRO	47UF	10WV		
C41			CK73EB1E104K	CHIP C	0.10UF	K		
C42			CK73EF1E474Z	CHIP C	0.47UF	Z		
C43			CK73FB1E103K	CHIP C	0.010UF	K		
C44 -46			CK73FB1H102K	CHIP C	1000PF	K		
C47			CK73FB1E223K	CHIP C	0.022UF	K		
C48			CK73FB1H102K	CHIP C	1000PF	K		
C49			CK73FB1E223K	CHIP C	0.022UF	K		
C50			CK73EB1E104K	CHIP C	0.10UF	K		
C51			CK73FB1H102K	CHIP C	1000PF	K		
C52			CK73FB1H392K	CHIP C	3900PF	K		
C53			CC73FSL1H101J	CHIP C	100PF	J	KP	
C53			CC73FSL1H101J	CHIP C	100PF	J	M	
C54			CK73EB1E104K	CHIP C	0.10UF	K		
C55			CK73FB1H102K	CHIP C	1000PF	K		
C56			CK73FB1H392K	CHIP C	3900PF	K		
C57			CC73FSL1H101J	CHIP C	100PF	J	KP	
C57			CC73FSL1H101J	CHIP C	100PF	J	M	
C58 ,59			CK73FB1E223K	CHIP C	0.022UF	K		
C60 ,61			CE04CW1A470M	ELECTRO	47UF	10WV		
C62 -65			CK73FB1H102K	CHIP C	1000PF	K		
C66 ,67			CK73EB1E104K	CHIP C	0.10UF	K		
C69 ,70			CK73FB1H102K	CHIP C	1000PF	K		
C71 ,72			CE04EW1A471M	ELECTRO	470UF	10WV		
C73			CE04CW0J470M	ELECTRO	47UF	6.3WV		
C74			CE04CW1A470M	ELECTRO	47UF	10WV		
C75			CE04CW1A470M	ELECTRO	47UF	10WV		
C76			CE04CW0J470M	ELECTRO	47UF	6.3WV		
C77			C90-2114-05	ELECTRO	220UF	16WV		
C78			CK73EB1E104K	CHIP C	0.10UF	K		
C79			CK73FB1H102K	CHIP C	1000PF	K		
C80			CK73FB1E223K	CHIP C	0.022UF	K		
C81			CK73FB1H102K	CHIP C	1000PF	K		
C82			CE04EW1A221M	ELECTRO	220UF	10WV		
C83			CK73FB1H102K	CHIP C	1000PF	K		

E: Scandinavia & Europe K: USA P: Canada W: Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
C84			CK73FB1E103K	CHIP C 0.010UF K		
C85			CE04EW1A221M	ELECTRO 220UF 10WV		
C86			CK73FB1H102K	CHIP C 1000PF K		
C87			CK73FB1H102K	CHIP C 1000PF K		
C88			CK73FB1E223K	CHIP C 0.022UF K		
C89			CK73FB1H102K	CHIP C 1000PF K		
C90			CC73FCH1H050C	CHIP C 5.0PF C	KP	
C90			CC73FCH1H050C	CHIP C 5.0PF C	M	
C91 -94			CC73FSL1H101J	CHIP C 100PF J	KP	
C91 -94			CC73FSL1H101J	CHIP C 100PF J	M	
C95			CK73FB1H102K	CHIP C 1000PF K		
C96			C92-0004-05	CHIP TAN 1UF 16WV		
C97 ,98			C92-0504-05	CHIP-TAN 0.68UF 20WV		
C99			CC73FCH1H050C	CHIP C 5.0PF C	M	
C99			CC73FCH1H330J	CHIP C 33PF J	KP	
C100,101			CK73FB1H102K	CHIP C 1000PF K		
C102,103			CK73FB1H471K	CHIP C 470PF K		
C104,105			CK73FB1H102K	CHIP C 1000PF K		
C106			CC73FCH1H150J	CHIP C 15PF J	KP	
C106			CC73FCH1H150J	CHIP C 15PF J	M	
C107			CE04CW1E100M	ELECTRO 10UF 25WV		
C108,109			CK73FB1H102K	CHIP C 1000PF K		
C110			CK73FB1H471K	CHIP C 470PF K		
C111			CK73FB1H102K	CHIP C 1000PF K		
C112			CK73FB1H471K	CHIP C 470PF K		
C113,114			CK73FB1H102K	CHIP C 1000PF K		
C115			CC73FCH1H220J	CHIP C 22PF J		
C116			C90-2115-05	ELECTRO 470UF 16WV		
C117			CK73EF1C105Z	CHIP C 1.0UF Z		
C118			CK73FB1E333K	CHIP C 0.033UF K		
C119			CK73EF1C105Z	CHIP C 1.0UF Z		
C120			CK73FB1E223K	CHIP C 0.022UF K		
C121			CC73FSL1H101J	CHIP C 100PF J	KP	
C121			CC73FSL1H101J	CHIP C 100PF J	M	
C122			CC73FSL1H221J	CHIP C 220PF J		
C123			CC73FCH1H150J	CHIP C 15PF J	KP	
C123			CC73FCH1H150J	CHIP C 15PF J	M	
TC1			C05-0346-05	TRIMMING CAP (6PF)		
CN2			E40-3247-05	PIN CONNECTOR (3P)		
CN3			E40-3246-05	PIN CONNECTOR (2P)		
CN4			E40-3251-05	PIN CONNECTOR (7P)		
CN5			E40-3237-05	PIN CONNECTOR (2P)		
CN6			E40-3252-05	PIN CONNECTOR (8P)		
CN7			E40-3246-05	PIN CONNECTOR (2P)		
CN8			E40-3251-05	PIN CONNECTOR (7P)		
CN9			E40-3246-05	PIN CONNECTOR (2P)		
CN10			E40-3248-05	PIN CONNECTOR (4P)		
TP1			E23-0465-05	TERMINAL		
CF1			L72-0315-05	CERAMIC FILTER (CFW455F)		
L2 -5			L34-4080-05	COIL		
L6			L34-0956-05	COIL		
L7 ,8			L30-0005-05	IFT	M	
L7 ,8			L34-4105-05	COIL	KP	
L9			L34-4015-05	COIL		

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⋇ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
L10			L40-3982-81	SMALL FIXED INDUCTOR(0.39UH)		
L11			L40-6872-80	SMALL FIXED INDUCTOR(68NH)		
L12			L40-1081-80	SMALL FIXED INDUCTOR(100NH)		
L13			L40-3972-80	SMALL FIXED INDUCTOR(39NH)		
X1			L77-0946-15	CRYSTAL RESONATOR(10.245MHZ)	M	
X1			L77-1369-05	CRYSTAL RESONATOR(17.355MHZ)	KP	
X2			L77-1405-05	CRYSTAL RESONATOR(12.8MHZ)		
XF1			L71-0228-05	MCF (10.7MHZ)	M	
XF1			L71-0279-05	MCF (16.9MHZ)	KP	
R6			RK73FB2A103J	CHIP R 10K J 1/10W	M	
R6			RK73FB2A103J	CHIP R 10K J 1/10W	KP	
R7			RK73FB2A274J	CHIP R 270K J 1/10W		
R8			RK73FB2A101J	CHIP R 100 J 1/10W		
R9			RK73FB2A103J	CHIP R 10K J 1/10W	M	
R9			RK73FB2A103J	CHIP R 10K J 1/10W	KP	
R10			RK73FB2A101J	CHIP R 100 J 1/10W		
R11 -14			RK73FB2A104J	CHIP R 100K J 1/10W		
R16 ,17			RK73FB2A473J	CHIP R 47K J 1/10W		
R18			RK73FB2A470J	CHIP R 47 J 1/10W	KP	
R18			RK73FB2A470J	CHIP R 47 J 1/10W	M	
R19			RK73FB2A274J	CHIP R 270K J 1/10W		
R20			RK73FB2A221J	CHIP R 220 J 1/10W	KP	
R20			RK73FB2A470J	CHIP R 47 J 1/10W	M	
R21			R92-0670-05	CHIP R 0 OHM	W	
R21			R92-0670-05	CHIP R 0 OHM	M	
R21			R92-0670-05	CHIP R 0 OHM	KP	
R22			RK73FB2A222J	CHIP R 2.2K J 1/10W	M	
R22			RK73FB2A222J	CHIP R 2.2K J 1/10W	KP	
R23			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R24			RK73FB2A182J	CHIP R 1.8K J 1/10W	M	
R24			R92-0670-05	CHIP R 0 OHM	KP	
R25			RK73FB2A101J	CHIP R 100 J 1/10W		
R26			RK73FB2A222J	CHIP R 2.2K J 1/10W	KP	
R26			RK73FB2A472J	CHIP R 4.7K J 1/10W	W	
R26			RK73FB2A472J	CHIP R 4.7K J 1/10W	M	
R27			RK73FB2A334J	CHIP R 330K J 1/10W		
R28			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R29			RK73FB2A683J	CHIP R 68K J 1/10W		
R30			RK73FB2A473J	CHIP R 47K J 1/10W		
R31			RK73FB2A333J	CHIP R 33K J 1/10W		
R32			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R33			RK73FB2A682J	CHIP R 6.8K J 1/10W	W	
R33			RK73FB2A682J	CHIP R 6.8K J 1/10W	KP	
R34			RK73FB2A334J	CHIP R 330K J 1/10W		
R35			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R36			RK73FB2A334J	CHIP R 330K J 1/10W		
R37			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R38			RK73FB2A271J	CHIP R 270 J 1/10W		
R39			RK73FB2A103J	CHIP R 10K J 1/10W	M	
R39			RK73FB2A103J	CHIP R 10K J 1/10W	KP	
R40			RK73FB2A472J	CHIP R 4.7K J 1/10W	KP	
R41			RK73FB2A103J	CHIP R 10K J 1/10W	KP	
R42			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R43			RK73FB2A562J	CHIP R 5.6K J 1/10W		

E: Scandinavia & Europe K: USA P: Canada W: Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⋇ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R44			RK73FB2A153J	CHIP R 15K J 1/10W		
R45			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R46			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R47			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R48			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R49			RK73FB2A153J	CHIP R 15K J 1/10W		
R50			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R51			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R52			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R53			RK73FB2A223J	CHIP R 22K J 1/10W		
R54			RK73FB2A473J	CHIP R 47K J 1/10W		
R55			RK73FB2A4R7J	CHIP R 4.7 J 1/10W		
R56			RK73FB2A4R7J	CHIP R 4.7 J 1/10W		
R57			RK73FB2A473J	CHIP R 47K J 1/10W		
R58 ,59			RK73FB2A101J	CHIP R 100 J 1/10W		
R60			RK73FB2A473J	CHIP R 47K J 1/10W		
R61			RK73FB2A153J	CHIP R 15K J 1/10W		
R62			RK73FB2A473J	CHIP R 47K J 1/10W		
R63 ,64			RK73FB2A103J	CHIP R 10K J 1/10W	M	
R63 ,64			RK73FB2A103J	CHIP R 10K J 1/10W	KP	
R65			RK73FB2A182J	CHIP R 1.8K J 1/10W	KP	
R65			RK73FB2A182J	CHIP R 1.8K J 1/10W	M	
R66			RK73FB2A334J	CHIP R 330K J 1/10W		
R67 ,68			RK73FB2A223J	CHIP R 22K J 1/10W		
R69			RK73FB2A103J	CHIP R 10K J 1/10W	M	
R69			RK73FB2A103J	CHIP R 10K J 1/10W	KP	
R70			RK73FB2A473J	CHIP R 47K J 1/10W		
R71			RK73FB2A182J	CHIP R 1.8K J 1/10W	KP	
R71			RK73FB2A182J	CHIP R 1.8K J 1/10W	M	
R72			RK73FB2A470J	CHIP R 47 J 1/10W	KP	
R72			RK73FB2A470J	CHIP R 47 J 1/10W	M	
R73			R92-0670-05	CHIP R 0 OHM	W	
R73			R92-0670-05	CHIP R 0 OHM	M	
R73			R92-0670-05	CHIP R 0 OHM	KP	
R74			RK73FB2A104J	CHIP R 100K J 1/10W		
R75			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R76			RK73FB2A471J	CHIP R 470 J 1/10W		
R77			RK73FB2A101J	CHIP R 100 J 1/10W		
R78			RK73FB2A221J	CHIP R 220 J 1/10W	KP	
R78			RK73FB2A221J	CHIP R 220 J 1/10W	M	
R79 ,80			R92-0670-05	CHIP R 0 OHM	W	
R79 ,80			R92-0670-05	CHIP R 0 OHM	M	
R79 ,80			R92-0670-05	CHIP R 0 OHM	KP	
R81			RK73FB2A222J	CHIP R 2.2K J 1/10W	M	
R81			RK73FB2A222J	CHIP R 2.2K J 1/10W	KP	
R82			RK73FB2A101J	CHIP R 100 J 1/10W		
R83			RK73FB2A154J	CHIP R 150K J 1/10W		
R84			RK73FB2A563J	CHIP R 56K J 1/10W		
R85			RK73FB2A223J	CHIP R 22K J 1/10W		
R86			RK73FB2A103J	CHIP R 10K J 1/10W	M	
R86			RK73FB2A103J	CHIP R 10K J 1/10W	KP	
R87			RK73FB2A472J	CHIP R 4.7K J 1/10W	M	
R87			RK73FB2A472J	CHIP R 4.7K J 1/10W	KP	
R87			RK73FB2A682J	CHIP R 6.8K J 1/10W	W	
R88			RK73FB2A272J	CHIP R 2.7K J 1/10W	KP	

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

⚠ *indicates safety critical components.*

TM-731A/E

PARTS LIST

⋇ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Telle ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R88			R92-0670-05	CHIP R 0 ΩHM	W	
R89			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R90			RK73FB2A222J	CHIP R 2.2K J 1/10W	M	
R90			RK73FB2A222J	CHIP R 2.2K J 1/10W	KP	
R91			RK73FB2A103J	CHIP R 10K J 1/10W	M	
R91			RK73FB2A103J	CHIP R 10K J 1/10W	KP	
R92			RK73FB2A471J	CHIP R 470 J 1/10W		
R93			RK73FB2A222J	CHIP R 2.2K J 1/10W	M	
R93			RK73FB2A222J	CHIP R 2.2K J 1/10W	KP	
R94			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R95			RK73FB2A223J	CHIP R 22K J 1/10W		
R96			RK73FB2A472J	CHIP R 4.7K J 1/10W	W	
R96			RK73FB2A472J	CHIP R 4.7K J 1/10W	M	
R96			RK73FB2A472J	CHIP R 4.7K J 1/10W	KP	
R97			RK73FB2A680J	CHIP R 68 J 1/10W		
R98			RK73FB2A101J	CHIP R 100 J 1/10W		
R99			RK73FB2A331J	CHIP R 330 J 1/10W		
R100			RK73FB2A470J	CHIP R 47 J 1/10W	KP	
R100			RK73FB2A470J	CHIP R 47 J 1/10W	M	
R101			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R102			RK73FB2A100J	CHIP R 10 J 1/10W		
R103			RK73FB2A683J	CHIP R 68K J 1/10W		
R104			RK73FB2A334J	CHIP R 330K J 1/10W		
R105			RK73FB2A101J	CHIP R 100 J 1/10W		
R106			RK73FB2A223J	CHIP R 22K J 1/10W		
R107			RK73FB2A103J	CHIP R 10K J 1/10W	M	
R107			RK73FB2A103J	CHIP R 10K J 1/10W	KP	
R108			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R109			R92-0670-05	CHIP R 0 ΩHM	W	
R109			R92-0670-05	CHIP R 0 ΩHM	M	
R109			R92-0670-05	CHIP R 0 ΩHM	KP	
R110			R92-0679-05	CHIP R 0 ΩHM		
VR1			R12-6431-05	TRIMMING PΩT.(220K)		
VR2		*	R12-6415-05	TRIMMING PΩT.(470)		
VR3			R12-6427-05	TRIMMING PΩT.(47K)		
D4 -6			1SV164	CHIP DIΩDE		
D7			1SV166	CHIP DIΩDE		
D8			1SV164	CHIP DIΩDE		
D9			1SS184	CHIP DIΩDE		
D10			HSM88AS	CHIP DIΩDE		
D11 ,12			1SS184	CHIP DIΩDE		
D13			1SS268	CHIP DIΩDE		
D14			1SS184	CHIP DIΩDE		
IC1			MC3361D	IC(FM IF SYSTEM)		
IC2			LA5010M	IC(LΩW SATURATIΩN REGULATΩR)		
IC3			TC4053BF	IC(3-INPUT 2CH MPX/DE-MPX)		
IC4		*	LA4446	IC(AF PA)		
Q1			3SK184(S)	CHIP FET		
Q2			3SK179(L)	CHIP FET		
Q3			2SC2714(Y)	CHIP TRANSISTΩR		
Q4 -10			2SC2712(Y)	CHIP TRANSISTΩR		
Q11 ,12			2SB1119S	CHIP TRANSISTΩR		
Q13			DTC144EK	DIGITAL TRANSISTΩR		
Q14			2SC2714(Y)	TRANSISTΩR		
Q16			DTC114EK	DIGITAL TRANSISTΩR		

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⋇ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
Q17			2SK208(O)	FET		
Q18 ,19			2SC2714(Y)	TRANSISTOR		
Q20			2SC2954	TRANSISTOR		
Q21			2SC2714(Y)	TRANSISTOR		
TH1			112-501-2	THERMISTOR (500 OHM)		
			X58-3660-00	SUB UNIT (144 PLL)	MW	
			X58-3670-10	SUB UNIT (144 PLL)	KP	
			X59-3610-00	MODULE UNIT (MIC AMP)		
144 MHz PLL UNIT (X58-3660-00) (M,W)						
C1			CK73FB1E223K	CHIP C 0.022UF K		
C2 ,3			CK73FB1H102K	CHIP C 1000PF K		
C4			CK73FB1E223K	CHIP C 0.022UF K		
C5			CK73FB1H471K	CHIP C 470PF K		
C6			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C7			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C8			C92-0003-05	CHIP TAN 0.47UF 25WV		
C9			CK73FB1E223K	CHIP C 0.022UF K		
C10			CC73FCH1H050C	CHIP C 5.0PF C		
C11 ,12			CK73FB1H102K	CHIP C 1000PF K		
C13			CK73FB1E223K	CHIP C 0.022UF K		
C101			CC73FCH1H220J	CHIP C 22PF J		
C102			CK73FB1H102K	CHIP C 1000PF K		
C103			CC73FCH1H020C	CHIP C 2.0PF C		
C104			CK73FB1H472K	CHIP C 4700PF K		
C105			CK73FB1H472K	CHIP C 4700PF K		
C106			CC73FCH1H010C	CHIP C 1.0PF C		
C107-109			CK73FB1H102K	CHIP C 1000PF K		
C110			CK73FB1H472K	CHIP C 4700PF K		
C111			CK73FB1H102K	CHIP C 1000PF K		
CN1			E40-5201-05	PIN CONNECTOR (7P)		
CN101			E40-0411-05	PIN CONNECTOR (4P)		
CN102			E40-0311-05	PIN CONNECTOR (3P)		
L1			L40-3391-19	SMALL FIXED INDUCTOR(3.3UF)		
L101			L40-1581-80	SMALL FIXED INDUCTOR(150NH)		
L102-104			L40-3391-19	SMALL FIXED INDUCTOR(3.3UH)		
L105			L34-2336-05	COIL		
R1 -5			RK73FB2A473J	CHIP R 47K J 1/10W		
R6			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R7			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R8			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R9			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R10			RK73FB2A103J	CHIP R 10K J 1/10W		
R11			RK73FB2A473J	CHIP R 47K J 1/10W		
R12			RK73FB2A103J	CHIP R 10K J 1/10W		
R13			RK73FB2A221J	CHIP R 220 J 1/10W		
R14			RK73FB2A223J	CHIP R 22K J 1/10W		
R101			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R102			RK73FB2A561J	CHIP R 560 J 1/10W		
R103			RK73FB2A101J	CHIP R 100 J 1/10W		
R104			RK73FB2A121J	CHIP R 120 J 1/10W		
R105			RK73FB2A470J	CHIP R 47 J 1/10W		
R106,107			R92-0670-05	CHIP R 0 OHM		
R108			RK73FB2A101J	CHIP R 100 J 1/10W		
R109			RK73FB2A470J	CHIP R 47 J 1/10W		

E: Scandinavia & Europe **K**: USA **P**: Canada **W**:Europe
U: PX(Far East, Hawaii) **T**: England **M**: Other Areas
UE: AAFES(Europe) **X**: Australia

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R110			RK73FB2A103J	CHIP R 10K J 1/10W		
D101,102			1T33C	VARICAP DIODE		
IC1			M54959FP	IC(FREQ SYNTHESIZER PLL)		
Q1 ,2			2SC3324(B)	TRANSISTOR		
Q3			DTC144EK	DIGITAL TRANSISTOR		
Q4			2SC2714(Y)	TRANSISTOR		
Q5			DTC144EK	DIGITAL TRANSISTOR		
Q101			2SC2714(Y)	TRANSISTOR		
Q102			2SK582	FET		
144 MHz PLL UNIT (X58-3670-10) (K,P)						
CN1			E40-5201-05	PIN CONNECTOR (7P)		
CN101			E40-0411-05	PIN CONNECTOR (4P)		
CN102			E40-0311-05	PIN CONNECTOR (3P)		
			F11-1122-14	SHIELDING COVER	KP	
L1			L40-3391-19	SMALL FIXED INDUCTOR(3.3UH)		
L101,102			L40-3391-19	SMALL FIXED INDUCTOR(3.3UH)		
L103			L34-2331-05	COIL		
L104-106			L40-4791-19	SMALL FIXED INDUCTOR(4.7UH)		
L107			L34-2332-05	COIL		
L108			L40-4791-19	SMALL FIXED INDUCTOR(4.7UH)		
R1 -5			RK73FB2A473J	CHIP R 47K J 1/10W		
R6			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R7			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R8			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R9			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R10 -12			RK73FB2A103J	CHIP R 10K J 1/10W		
R13			RK73FB2A221J	CHIP R 220 J 1/10W		
R14			RK73FB2A223J	CHIP R 22K J 1/10W		
R101			RK73GB1J101J	CHIP R 100 J 1/16W		
R102			RK73GB1J470J	CHIP R 47 J 1/16W		
R103			RK73GB1J101J	CHIP R 100 J 1/16W		
R104			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R105			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R106			RK73GB1J471J	CHIP R 470 J 1/16W		
R107			RK73GB1J101J	CHIP R 100 J 1/16W		
R108			RK73GB1J470J	CHIP R 47 J 1/16W		
R109			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R110			RK73GB1J470J	CHIP R 47 J 1/16W		
R111			RK73GB1J101J	CHIP R 100 J 1/16W		
R112			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R113			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R114			RK73GB1J471J	CHIP R 470 J 1/16W		
C1			CK73FB1E223K	CHIP C 0.022UF K		
C2 ,3			CK73FB1H102K	CHIP C 1000PF K		
C4			CK73FB1E223K	CHIP C 0.022UF K		
C5			CK73FB1H471K	CHIP C 470PF K		
C6 ,7			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		
C8			C92-0003-05	CHIP-TAN 0.47UF 25WV		
C9			CK73FB1E223K	CHIP C 0.022UF K		
C10			CK73FCH1H050C	CHIP C 5.0PF C		
C11 ,12			CK73FB1H102K	CHIP C 1000PF C		

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

⋇ New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
C13 ,14			CK73FB1E223K	CHIP C 0.022UF K		
C101			CK73GB1E103K	CHIP C 0.01UF K		
C102			CC73GCH1H010C	CHIP C 1.0PF C		
C103,104			CK73GB1E103K	CHIP C 0.01UF K		
C105			CC73GCH1H010C	CHIP C 1.0PF C		
C106			CC73GCH1H220J	CHIP C 22PF J		
C107,108			CK73GB1H102K	CHIP C 1000PF K		
C109,110			CK73GB1E103K	CHIP C 0.01UF K		
C111			CC73GCH1H020C	CHIP C 2.0PF C		
C112,113			CK73GB1E103K	CHIP C 0.01UF K		
C114			CC73GCH1H010C	CHIP C 1.0PF C		
C115			CC73GCH1H220J	CHIP C 22PF J		
C116			CK73GB1H102K	CHIP C 1000PF K		
D101,102			1T33C	DIODE		
D103,104			1SV166	DIODE		
IC1			M54959FP	IC(FREQ SYNTHESIZER PLL)		
Q1 ,2			2SC3324(B)	TRANSISTOR		
Q3			DTC144EK	DIGITAL TRANSISTOR		
Q4			2SC2714(Y)	TRANSISTOR		
Q5			DTC144EK	DIGITAL TRANSISTOR		
Q101			2SK508NV(K52)	FET		
Q102			DTC114EK	DIGITAL TRANSISTOR		
Q103			2SC3120	TRANSISTOR		
Q104			2SK508NV(K52)	FET		
Q105			DTC114EK	DIGITAL TRANSISTOR		
Q106			2SC3120	TRANSISTOR		
430 MHz PLL UNIT (X58-3680-00)						
C1			CK73FB1E223K	CHIP C 0.022UF K		
C2			CK73FB1H102K	CHIP C 1000PF K		
C3			CC73FCH1H040C	CHIP C 4.0PF C		
C4			CK73FB1H102K	CHIP C 1000PF K		
C5			CK73EB1H683K	CHIP C 0.068UF K		
C6 ,7			CK73FB1E223K	CHIP C 0.022UF K		
C8 ,9			C92-0007-05	CHIP TAN 2.2UF 20WV		
C10			C92-0002-05	CHIP TAN 0.22UF 35WV		
C11			CK73FB1E223K	CHIP C 0.022UF K		
C12			CC73FCH1H100D	CHIP C 10PF D		
C13			CK73FB1E223K	CHIP C 0.022UF K		
C101			CK73FB1H102K	CHIP C 1000PF K		
C102			CK73FB1H471K	CHIP C 470PF K		
C103			CC73FCH1H470J	CHIP C 47PF J		
C104			CC73FCH1H120J	CHIP C 12PF J		
C105			CC73FCH1H080D	CHIP C 8.0PF D		
C106,107			CC73FCH1HR75C	CHIP C 0.75PF C		
C108			CC73FCH1HR75C	CHIP C 0.75PF C		
C109			CC73FCH1H0R5C	CHIP C 0.5PF C		
C110			CC73FCH1H090D	CHIP C 9.0PF D		
C110			CC73FCH1H080D	CHIP C 8.0PF D		
C111			CC73FCH1H0R5C	CHIP C 0.5PF C		
C112			CC73FCH1H040C	CHIP C 4.0PF C		
C113			CK73FB1H102K	CHIP C 1000PF K		
C114			CK73FB1H102K	CHIP C 1000PF K		
CN1			E40-5201-05	PIN CONNECTOR (7P)		
CN101			E40-0411-05	PIN CONNECTOR (4P)		

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

⚠ indicates safety critical components.

TM-731A/E

PARTS LIST

⁎ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
CN102			E40-0311-05	PIN CONNECTOR (3P)		
			F11-1122-14	SHIELDING COVER		
L1			L40-3972-80	SMALL FIXED INDUCTOR(39NH)		
L101,102			L40-8282-19	SMALL FIXED INDUCTOR(0.82UH)		
L103			L34-2333-05	COIL		
L104			L40-5682-19	SMALL FIXED INDUCTOR(0.56UH)		
L105			L40-3382-19	SMALL FIXED INDUCTOR(0.33UH)		
L106			L40-3972-80	SMALL FIXED INDUCTOR(39NH)		
R1			RK73FB2A473J	CHIP R 47K J 1/10W		
R2			RK73FB2A473J	CHIP R 47K J 1/10W		
R3			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R4			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R5			RK73FB2A221J	CHIP R 220 J 1/10W		
R6			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R7			RK73FB2A474J	CHIP R 470K J 1/10W		
R8			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R9			RK73FB2A822J	CHIP R 8.2K J 1/10W		
R10 -12			RK73FB2A473J	CHIP R 47K J 1/10W		
R13			RK73FB2A103J	CHIP R 10K J 1/10W		
R14			RK73FB2A331J	CHIP R 330 J 1/10W		
R15			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R16			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R17			RK73FB2A473J	CHIP R 47K J 1/10W		
R101			R92-0670-05	CHIP R 0 OHM		
R102			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R103			RK73FB2A683J	CHIP R 68K J 1/10W		
R104			RK73FB2A470J	CHIP R 47 J 1/10W		
R105			RK73FB2A560J	CHIP R 56 J 1/10W		
R106			RK73FB2A101J	CHIP R 100 J 1/10W		
R107			RK73FB2A470J	CHIP R 47 J 1/10W		
R108			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R109			RK73FB2A103J	CHIP R 10K J 1/10W		
D101,102			1T33C	CHIP DIODE		
D103			1SV164	CHIP DIODE		
IC1			M54959FP	CHIP IC(FREQ SYNTHESIZER PLL)		
Q1 -3			2SC3324(B)	CHIP TRANSISTOR		
Q4			DTC144EK	CHIP DISITAL TRANSISTOR		
Q5			2SC2714(Y)	CHIP TRANSISTOR		
Q6			DTC144EK	CHIP DIGITAL TRANSISTOR		
Q101			2SK582	CHIP FET		
Q102			2SC3120	CHIP TRANSISTOR		
			MODULE UNIT (X59-3610-00)			
			CK73FF1E104Z	CHIP C 0.10UF Z		
C1			CK73FB1E333K	CHIP C 0.033UF K		
C3			CK73FB1E333K	CHIP C 0.033UF K		
C5			C92-0004-05	CHIP TAN 1UF 16WV		
C6			CK73FB1E333K	CHIP C 0.033UF K		
			E23-0471-05	TERMINAL		
			RK73FB2A473J	CHIP R 47K J 1/10W		
			RK73GB1J394J	CHIP R 390K J 1/16W		
R1			RK73GB1J223J	CHIP R 22K J 1/16W		
R2			RK73GB1J104J	CHIP R 100K J 1/16W		

E: Scandinavia & Europe K: USA P: Canada W: Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

⚠ indicates safety critical components.

PARTS LIST

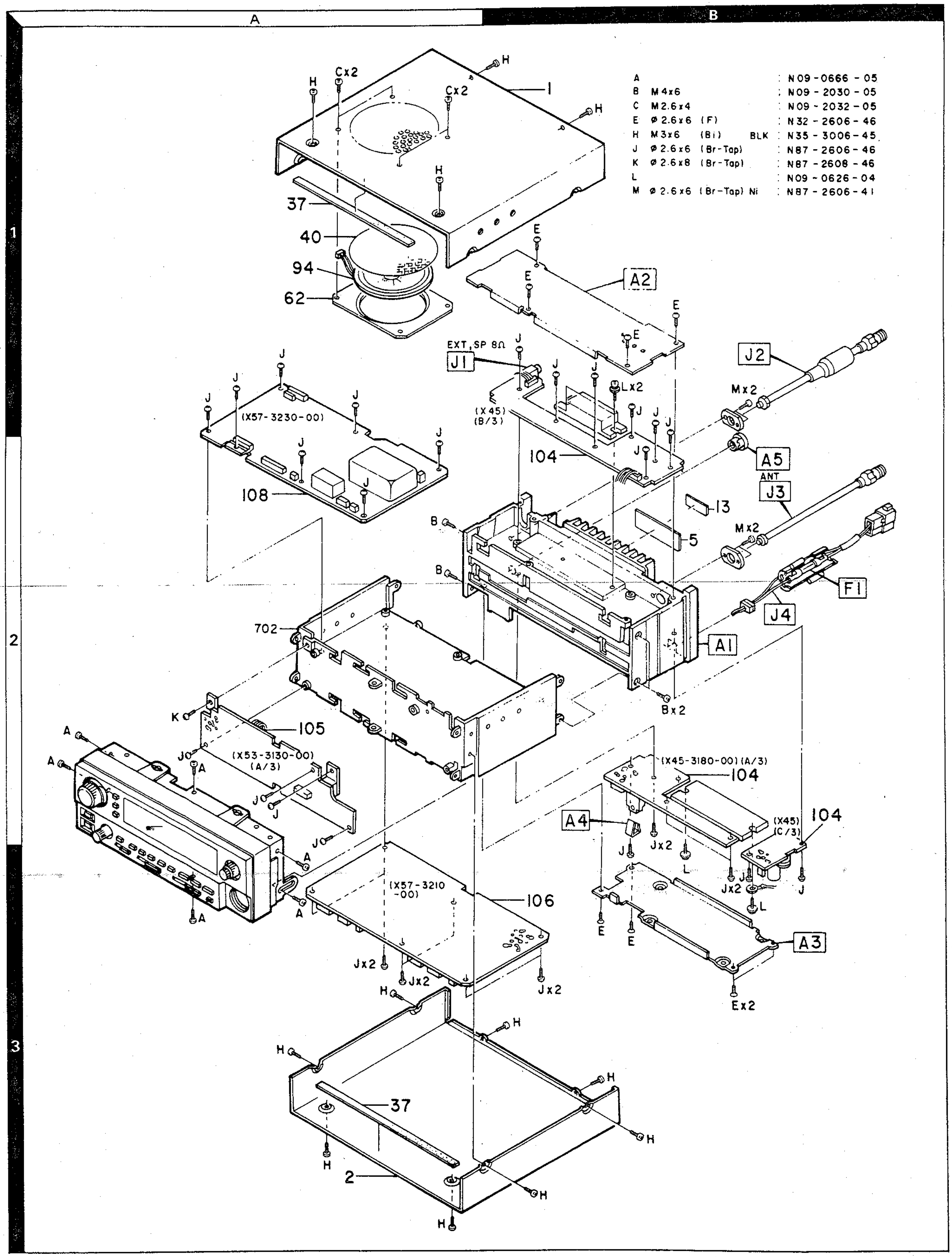
⋇ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R3			RK73GB1J561J	CHIP R 560 J 1/16W		
R4			RK73GB1J470J	CHIP R 47 J 1/16W		
R5			RK73GB1J561J	CHIP R 560 J 1/16W		
R6			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R8			RK73GB1J224J	CHIP R 220K J 1/16W		
R9			RK73GB1J184J	CHIP R 180K J 1/16W		
R10			RK73GB1J333J	CHIP R 33K J 1/16W		
R12			RK73GB1J224J	CHIP R 220K J 1/16W		
R13 -15			RK73GB1J823J	CHIP R 82K J 1/16W		
R16			RK73GB1J000J	CHIP R 0.0 J 1/16W		
			CK73GB1H102K	CHIP C 1000PF K		
			CK73GB1H332K	CHIP C 0.0033PF K		
			CK73GB1H681K	CHIP C 680PF K		
C4			CC73GCH1H270J	CHIP C 27PF J		
C9			CC73GCH1H820J	CHIP C 82PF J		
C10			CC73GCH1H101J	CHIP C 100PF J		
IC1			NJM4558M	IC(OP AMP X2)		
Q1			2SC4116(Y)	TRANSISTOR		

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

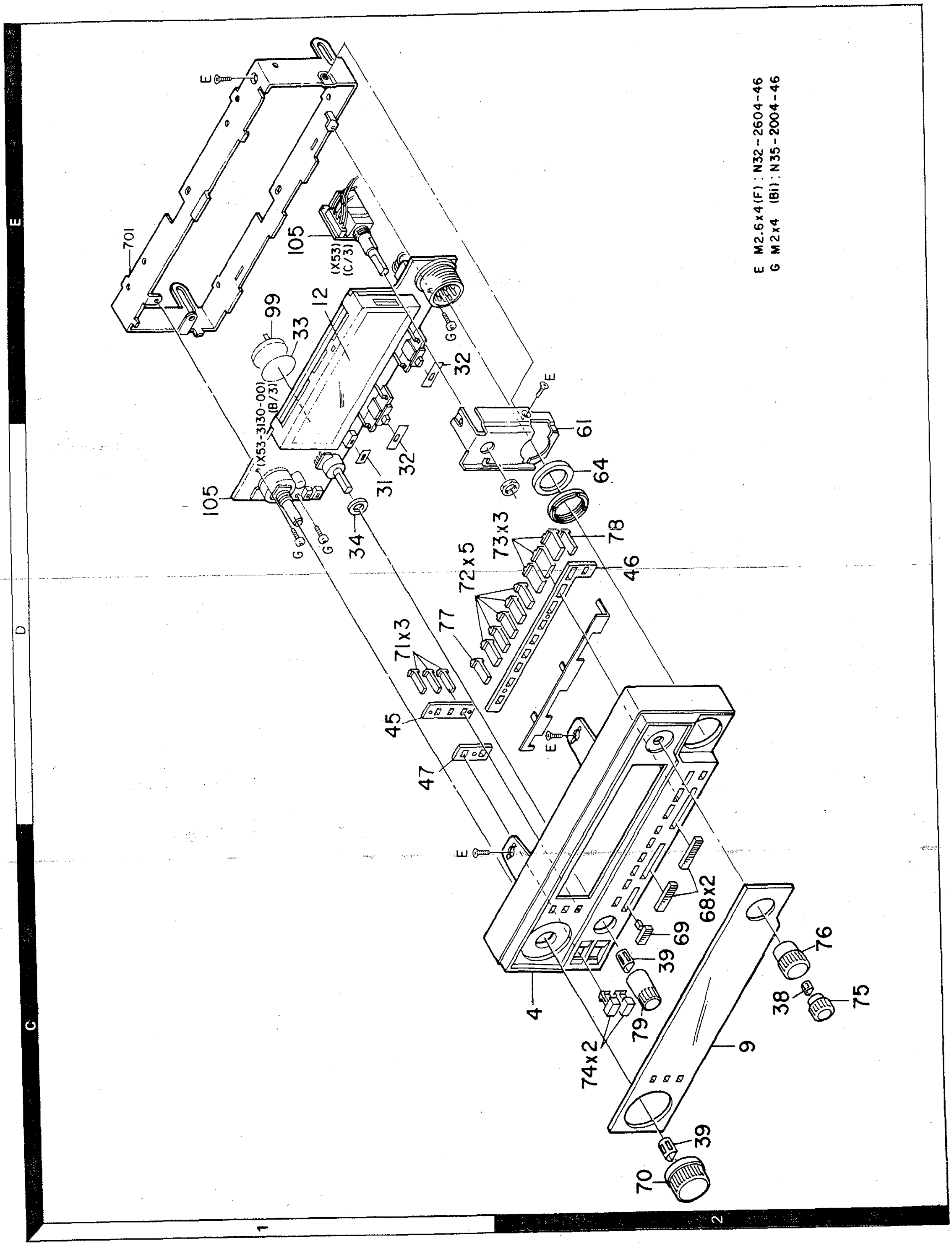
⚠ indicates safety critical components.

EXPLODED VIEW

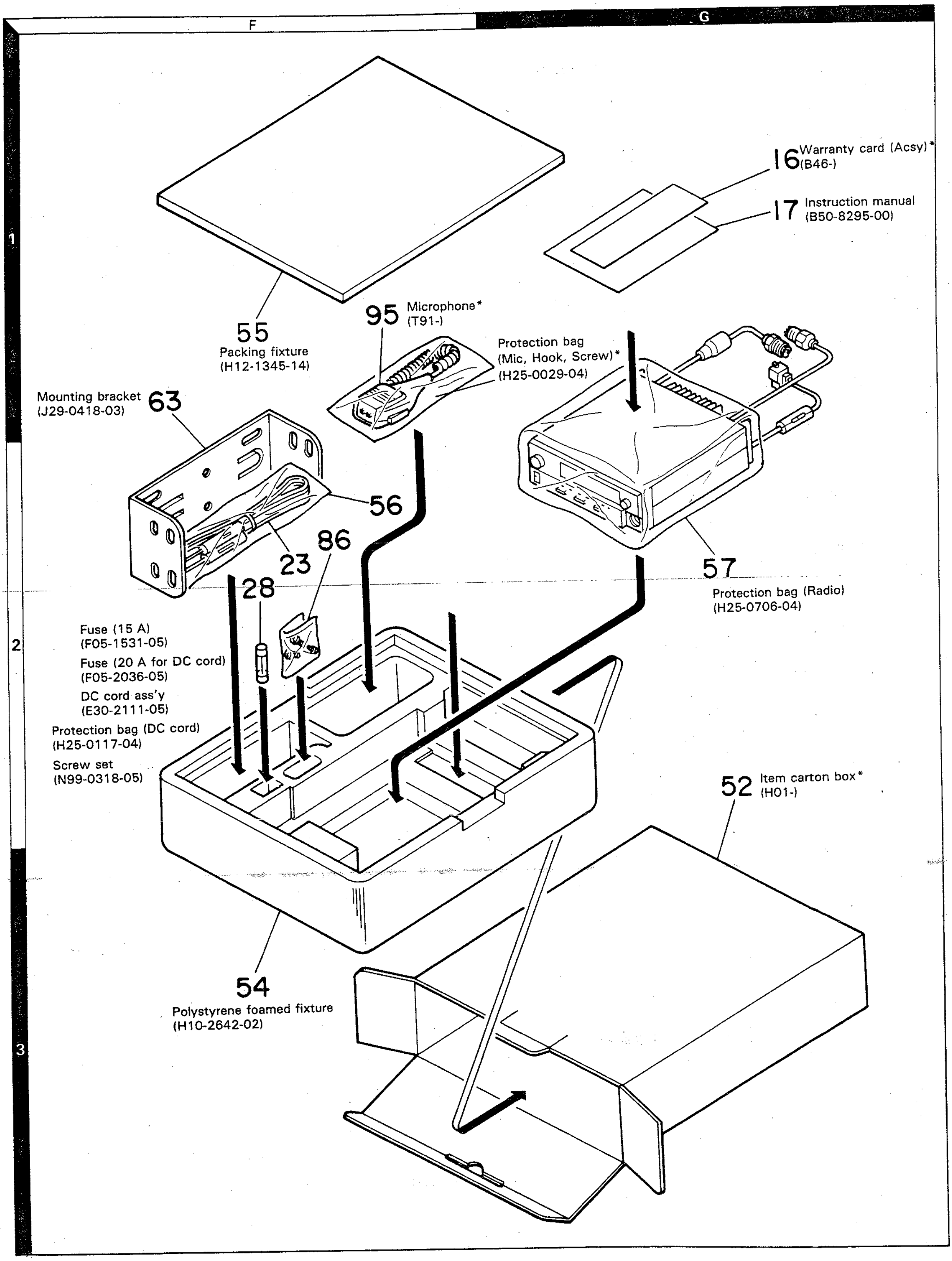


A				: N09-0666-05
B	M4x6			: N09-2030-05
C	M2.6x4			: N09-2032-05
E	ø2.6x6	(F)		: N32-2606-46
H	M3x6	(Bi)	BLK	: N35-3006-45
J	ø2.6x6	(Br-Tap)		: N87-2606-46
K	ø2.6x8	(Br-Tap)		: N87-2608-46
L				: N09-0626-04
M	ø2.6x6	(Br-Tap) Ni		: N87-2606-41

EXPLODED VIEW



PACKING


F
G
1
2
3
16 Warranty card (Acsy)*
(B46-)
17 Instruction manual
(B50-8295-00)
55
Packing fixture
(H12-1345-14)
95 Microphone*
(T91-)
Protection bag
(Mic, Hook, Screw)*
(H25-0029-04)
Mounting bracket 63
(J29-0418-03)
56
23
86
28
57
Protection bag (Radio)
(H25-0706-04)
Fuse (15 A)
(F05-1531-05)
Fuse (20 A for DC cord)
(F05-2036-05)
DC cord ass'y
(E30-2111-05)
Protection bag (DC cord)
(H25-0117-04)
Screw set
(N99-0318-05)
52 Item carton box*
(H01-)
54
Polystyrene foamed fixture
(H10-2642-02)

ADJUSTMENT

REQUIRED TEST EQUIPMENT

1. **DC V.M**
   1) High input impedance
2. **RF VTVM (RF V.M)**
   1) Input impedance : 1 MΩ min., 2 pF max.
   2) Voltage range : F.S = 10 mV ~ 300 V
3. **Frequency Counter (f. counter)**
   1) Input sensitivity : Approx. 50 mV
   2) Frequency range : Up to 450 MHz
4. **DC Power Supply**
   1) Voltage : 10 V ~ 17 V, variable
   2) Current : 15 A min.
5. **Power Meter**
   1) Measurement range Approx. : 50 W, 3 W, 1 W
   2) Input impedance : 50 Ω
   3) Frequency range : 450 MHz
6. **AF VTVM (AF V.M)**
   1) Input impedance : 1 MΩ min.
   2) Voltage range : F.S = 1 mV ~ 30 V
   3) Frequency range : 50 Hz ~ 10 kHz
7. **AF Generator (AG)**
   1) Output frequency : 100 Hz ~ 10 kHz
   2) Output voltage : 0.5 mV ~ 1 V
8. **Linear Detector**
   ~~1) Frequency range : 450 MHz~~
9. **Field Strength Meter**
   1) Frequency range : 450 MHz
10. **Directional Coupler**
11. **Oscilloscope**
    1) High sensitivity oscilloscope with horizontal input terminal
12. **SSG**
    1) Frequency range : 144 MHz and 430 MHz bands
    2) Modulation : AM and FM MOD.
    3) Output level : −20 dB to 100 dB
13. **Dummy Load**
    1) 8 Ω, 50 W (approx.)
14. **Noise Generator**
    1) Must generate ignition-like noise containing harmonics beyond 450 MHz.
15. **Sweep Generator**
    1) Sweep range : 1440 MHz and 430 MHz bands
16. **Tracking Generator**

PREPARATION

1) Unless otherwise specified, knobs and switches should be set as follows **Table 7**.

POWER SW	ON	SUB SQ VR	OFF
AF VOL VR	MIN	SCAN/L. OUT	OFF
MAIN SQ VR	MIN	SHIFT/AL	OFF
LOW SW	HI	TONE/T. SEL	OFF
CALL SW	OFF	REV/STEP	OFF
VFO SW	ON	MUTE/CTCSS	OFF
F. LOCK SW	OFF	A, B, C	OFF
BALANCE VR	MAIN	DUAL SW	OFF
		BAND ACC	OFF

Table 7

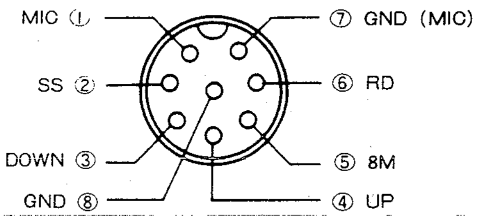


Fig. 26 MIC terminals (view from front panel side)

2) Use an insulated adjusting rod to adjust trimmers and coils.
3) To prevent damaging SSG, never connect the microphone to mic jack while adjusting the receiver section.
4) Be sure to turn the power switch OFF, before connecting the power cable to a power source.
5) SSG output levels are those at the time the output terminal is open.
6) Meter and display section should be set as follows **Fig. 27**.

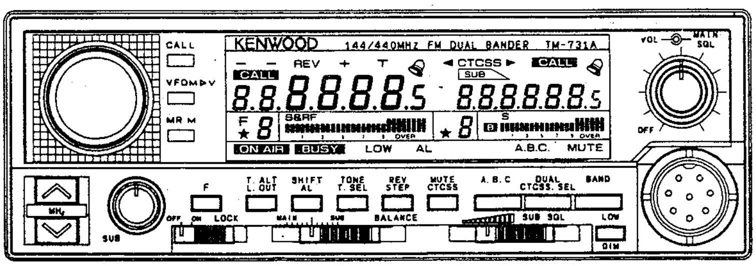


Fig. 27

ADJUSTMENT

Common Section Adjustments

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equip-ment	Unit	Terminal	Unit	Part	Method	
1. Setting	DC 13.8 V POWER OFF MAIN SQL. MIN. BALANCE CENTER SUB SQL. MAX. LOCK OFF * Standard modulation (MOD. 1 kHz, DEV. ±3 kHz) when modulation of SSG is not specified.							
2. Reset	Turn POWER ON while pressing F key							MAIN 433.000 (M,W) 440.000 (K,P) SUB 144.000
	DUAL PUSH							

PLL Adjustments

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equip-ment	Unit	Terminal	Unit	Part	Method	
1. VCO voltage	FREQ. 435.000 MHz (T), 445.000 MHz (K,M,P) (for both transmission and reception)	Digital voltmeter Dummy load×2	TX-RX (430)	TP3	TX-RX (430)			2.5~4.5 (W) 3.0~5.0 (K,M,P) } receive 5.0~7.0 (W) 6.0~8.0 (K,M,P) } transmit
	FREQ. 144.975 MHz (T), 146.000 MHz (K,M,P) (for both transmission and reception)		TX-RX (144)	L10 right side Pattern				1.7~2.4 V (receive) 3.2~3.8 V (transmit)

144 MHz Receiver Adjustments

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equip-ment	Unit	Terminal	Unit	Part	Method	
1. Receiving sensitivity	FREQ. 145.050 MHz (W) 146.040 MHz (K,M,P) SSG 0 dBμ MOD : OFF	Tester	TX-RX (144)	TP1	TX-RX (144)	L2,3,4 5,6,7,8	MAX.	
2. Discriminator	FREQ. 145.050 MHz (W) 146.040 MHz (K,M,P) SSG 0 dBμ	Oscilloscope, Millivoltmeter Dummy load (8 ohms)	Rear	ANT2	TX-RX (144)	L9	AF indication max.	Maximum sensitivity: 4 V or more.
3. Squelch (Tight squelch)	FREQ. 145.050 MHz (W) 146.040 MHz (K,M,P) MAIN SQL. MAX. SSG −6 dBμ	Oscilloscope, Millivoltmeter Dummy load (8 ohms)	ANT2	TX-RX	VR1 (144)		Set to the position where noise is not heard.	
	SSG −4 dB							Squelch should be opened.
	SSG OFF Rotate SGL to the position where noise is not heard.							8:00~9:30
	SSG −15 dBμ							Squelch should be opened.

ADJUSTMENT

Item	Condition	Measurement: Test equipment	Measurement: Unit	Measurement: Terminal	Adjustment: Unit	Adjustment: Part	Adjustment: Method	Specification/Remarks
4. S-meter	FREQ. 145.050 MHz (W) 146.040 MHz (K,M,P) SSG −3 dBμ	SSG SP	Rear panel, Front panel	TX-RX (144)	TX-RX (144)	VR2	Set to to S.1 position.	
	SSG 25 dBμ							All LED light up.
5. Receiving sensitivity	145.050 MHz (W) 146.040 MHz (K,M,P) SSG −10 dBμ	Oscilloscope Millivoltmeter Distortion meter						SINAD 12 dB or more
	Adjust the band edge in the same way. FREQ. 144.050 MHz, 145.950 MHz (W) 144.040 MHz, 147.940 MHz (K,M,P)							
6. Signal-to-noise (S/N) ratio with high-level signal	145.050 MHz (W) 146.040 MHz (K,M,P) SSG 60 dBμ AF 0.63 V/8 Ω							S/N ratio of 46 dB or better

Common Transmitter Adjustments

Item	Condition	Measurement: Test equipment	Measurement: Unit	Measurement: Terminal	Adjustment: Unit	Adjustment: Part	Adjustment: Method	Specification/Remarks
Transmission frequency	435.000 MHz (W) 445.000 MHz (K,M,P) LO : ON Make transmission.	F.counter Dummy load	Rear panel	ANT2	TX-RX (144)	TC1	435.000 MHz (W) 445.000 MHz (K,M,P)	±100 Hz

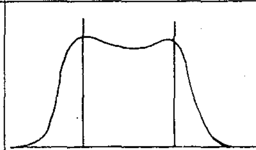
144 MHz Transmitter Adjustments

Item	Condition	Measurement: Test equipment	Measurement: Unit	Measurement: Terminal	Adjustment: Unit	Adjustment: Part	Adjustment: Method	Specification/Remarks
1-1. Transmission output (HI power)	FREQ. 144.975 MHz (W) 146.000 MHz (K,M,P) HI/LO switch: HI Make transmission.	Power meter Ammeter (Use DC power supply having ammeter)	Rear panel	ANT1 (144)	Final (144)	VR2	POWER MAX.	55 W or more
							52 W	52 W ±1 W, less than 11.0 A
1-2. Transmission output (LO power)	FREQ. 144.975 MHz (W) 146.000 MHz (K,M,P) HI/LO switch : LO (When "LOW" appears on the display, start transmitting.)				Final (144)	VR4	5 W	Check ±0.5 W
	FREQ. 144.000 MHz, 145.975 MHz (W) 144.000 MHz, 147.980 MHz (K,M,P) HI/LO switch : HI Make transmission.							48~56 W, less than 11.0 A
2. RF meter	FREQ. 144.975 MHz (W) 146.000 MHz (K,M,P) HI/LO switch: LO Make transmission.	Power meter or dummy load (50 ohms)						RF-7 light up.
	HI/LO switch: HI Make transmission.							All LED light up.

ADJUSTMENT

Item	Condition	Measurement: Test equipment	Measurement: Unit	Measurement: Terminal	Adjustment: Unit	Adjustment: Part	Adjustment: Method	Specification/Remarks
3-1. DEV	FREQ. 144.975 MHz (W) 146.000 MHz (K,M,P) AG 1 kHz, 28 mV (W) 50 mV (K,M,P) Make transmission.	Linear detector Dummy (50 ohms) Divider Oscilloscope	Rear	ANT1 (144)	TX-RX (144)	VR3	±4.6 kHz (either + or − value which is larger)	±200 Hz There should be no abnormal within detecting range. Linear detector condition: LPF: OFF HPF: 20 kHz Deemphasis: OFF
3-2. MIC GAIN	AG 1 kHz 2.8 mV (W) 5 mV (K,M,P) Make transmission.							±2.4 kHz ~ ±3.6 kHz Check above
4. Protection (CURRENT)	FREQ. 144.975 MHz (W) 146.000 MHz (K,M,P) ANT open Make transmission.	Ammeter			Final (144)	VR3	5.5 A	±0.2 A
5. TONE	FREQ. 145.100 MHz (K,M,P) Make transmission.	Linear detector, Dummy load (50 ohms)		ANT (144)			f: 88 ~ 89 Hz DEV.: ±0.5 ~ 1 kHz Linear detector condition	LPF: 3 kHz HPF: 20 kHz Deemphasis: OFF
	FREQ. 145.100 MHz (W) Make transmission. Tone push (W)						f:1750 Hz ±10 Hz DEV. ±2.5 kHz or more	

430 MHz Receiver Adjustments

Item	Condition	Measurement: Test equipment	Measurement: Unit	Measurement: Terminal	Adjustment: Unit	Adjustment: Part	Adjustment: Method	Specification/Remarks
1. BPF (430 MHz) (440 MHz)	FREQ. 435.050 (M,W) 445.050 (K,P) Connect a sweep generator or tracking generator to ANT1 (430 MHz, ANT terminal). Connect spectrum analyzer to the test point (TP1).	Tracking generator or Sweep generator		ANT1	TX-RX (430)	TC1,2 L3,4	The specified range should be secured with the GAIN set to MAX position.	
		Spectrum analyzer	TX-RX (430)	TP1				
2. Receiving sensitivity	FREQ. 435.040 MHz (M,W) 445.050 MHz (K,P) SSG 0 dBμ MOD : OFF	Tester	TX-RX (430)	TP2	TX-RX (430)	L8, 9	MAX.	
3. Dis-criminator	FREQ. 435.040 MHz (M,W) 445.050 MHz (K,P) SSG 0 dBμ	Oscilloscope Millivoltmeter	Rear panel	EXT. SP	TX-RX (430)	L11	MAX.	
4. Squelch (tight squelch)	FREQ. 435.040 MHz (M,W) 445.050 MHz (K,P) MAIN SQL. MAX. SSG −6 dBμ	Oscilloscope Millivoltmeter		EXT. SP	TX-RX (430)	VR1	Set to the position where noise is not heard.	
	SSG −4 dBμ							Squelch open
	SSG OFF Rotate SQL to set to the position where noise is not heard.							8:00 ~ 9:30
S-meter	FREQ. 435.040 MHz (M,W) 445.050 MHz (K,P) SSG −4 dBμ	SSG SP	Rear panel Front panel	ANT1 S-meter	TX-RX (430)	VR2	Set to S1.	
	SSG 25 dBμ							All LED light up.
Sensitivity	FREQ. 435.040 MHz (M,W) 445.050 MHz (K,P) SSG −9 dBμ	Oscilloscope Millivoltmeter Distortion meter		SP				12 dB SINAD or more
	Set the band edge in the same way. FREQ. 430.040 MHz, 439.940 MHz (M,W) 438.940 MHz, 449.940 MHz (K,P)							

ADJUSTMENT

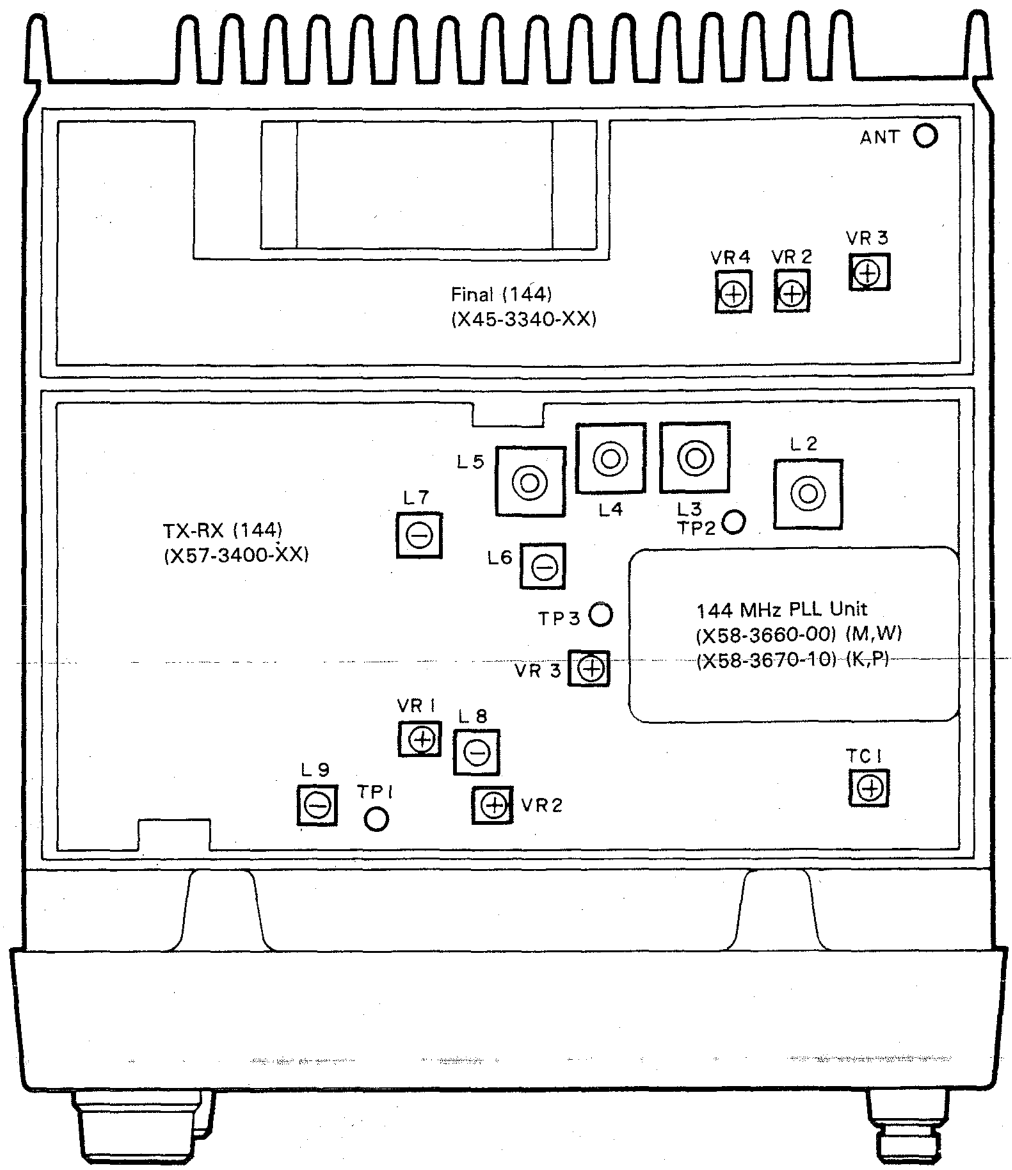
Item	Condition	Measurement: Test equipment	Measurement: Unit	Measurement: Terminal	Adjustment: Unit	Adjustment: Part	Adjustment: Method	Specification/Remarks
7. Signal-to-noise (S/N) ratio with high level input	FREQ. 435.050 MHz (W) 445.050 MHz (K,M,P) SSG 60 dBμ AF 0.63 V/8 Ω	Oscilloscope Millivoltmeter Distortion meter		SP				S/N ratio of 46 dB or better

430 MHz Transmission Adjustments

Item	Condition	Measurement: Test equipment	Measurement: Unit	Measurement: Terminal	Adjustment: Unit	Adjustment: Part	Adjustment: Method	Specification/Remarks
1-1. Transmission output (HI power)	FREQ. 435.000 MHz (M,W) 445.000 MHz (K,P) HI/LO switch : HI Make transmission.	Power meter Ammeter (Use DC power supply having ammeter)	Rear panel	ANT1 (430)	TX-RX (430MHz)	VR5	POWER MAX.	37 W or more
							36 W	36 W ±1 W, less than 8.5 A
1-2. Transmission output (LO power)	FREQ. 435.000 MHz (M,W) 445.000 MHz (K,P) HI/LO switch : LO ("LOW" is shown on the display)				TX-RX (430MHz)	VR7	5 W	Check 5 W ±0.5 W
	FREQ. 430.000 MHz, 439.980 MHz (M,W) 438.000 MHz, 449.975 MHz (K,P) HI/LO switch : HI Make transmission.							34~40 W, less than 8.5 A
2. RF meter	FREQ. 435.000 MHz (M,W) 445.000 MHz (K,P) Make transmission.							RF 7 digit light up.
3. DEV	FREQ. 435.000 MHz (M,W) 445.000 MHz (K,P) AG 1 kHz, 28 mV (W) 50 mV (K,M,P) Make transmission.	Direct dummy (0 ohm) oscilloscope Divider	Rear	ANT	TX-RX (430)	VR3	±4.6 kHz (either + or − value which is larger)	±200 Hz There should be no abnormality in detection waveforms. Direct condition LPF : OFF HPF : 20 kHz Deemphasis : OFF
3-2. MIC GAIN	AG 1 kHz 2.8 mV (W,M) 5.0 mV (K,P) Make transmission.							±2.4 kHz~±3.6 kHz
4. Protection	FREQ. 435.000 MHz (M,W) 445.000 MHz (K,P) ANT short Make transmission.	Ammeter			TX-RX (430)	VR4	4.0 A (M,W) 5.0 A (K,P)	±0.2 A
5. TONE	1) 435.100 MHz (M) 445.100 MHz (K,P) Make transmission.	Direct Dummy load (50 ohms) Oscilloscope	Rear panel	ANT			f: 88~89 MHz DEV.: ±0.6~1 kHz Linear detector condition	LPF: 50 MHz HPF: 3 kHz Deemphasis: OFF
	2) 435.100 MHz (W) Make transmission.						f : 1750 Hz ±10 Hz DEV.: ±2.5 kHz or more	

ADJUSTMENT

Top of the Set



Final Unit (X45-3340-XX)

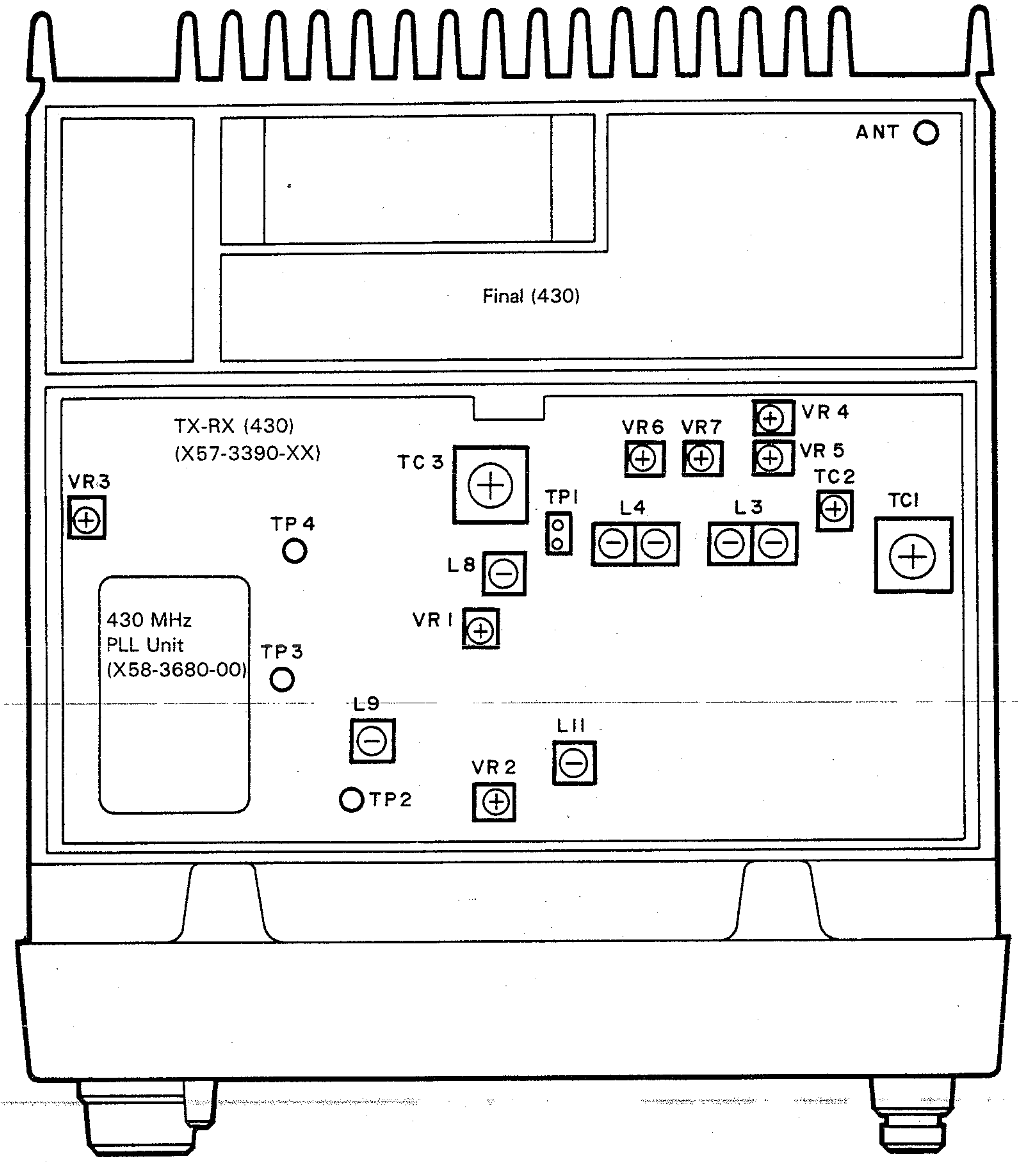
VR2 : 144 MHz HI power (APC) adjustment
VR3 : 144 MHz protection adjustment
VR4 : 144 MHz LOW power adjustment

TX-RX Unit (144 MHz)
(X57-3400-XX)

VR1 : 144 MHz squelch (tight squelch) adjustment
VR2 : 144 MHz S-meter adjustment
VR3 : 144 MHz DEV. adjustment
TC1 : TX f.adjustment
L2 ~ 8 : 144 MHz receiving gain adjustment
L9 : Discriminator adjustment

ADJUSTMENT

Bottom of the Set



TX-RX unit (430 MHz) (X57-3390-XX)

VR1 : 430 MHz squelch (tight squelch) adjustment
VR2 : 430 MHz S-meter adjustment
VR3 : 430 MHz DEV. adjustment
VR4 : 430 MHz protection adjustment
VR5 : 430 MHz HI power adjustment
VR6 : 430 MHz RF meter adjustment

VR7 : 430 MHz LOW power adjustment
L3, 4 : 430 MHz helical adjustment
L8, 9 : 430 MHz receiving gain adjustment
L11 : 430 MHz discriminator adjustment
TC1,2 : 430 MHz helical adjustment
TC3 : 430 MHz receiving gain adjustment

TERMINAL FUNCTIONS

Connector No.	Terminal No.	Terminal name	Function
430 MHz TX-RX UNIT (X57-3390-XX)			
CN1		RA1	RX ANT (430 MHz)
		E	GND
CN2	1	E	GND
	2	DET	Detect (144 MHz)
CN3	1	SC1	SCAN Control (MAIN)
	2	RDM	Remote Data (MAIN)
	3	E	GND
	4	SC2	SCAN Control (SUB)
	5	SQ2	Squelch Volume (SUB)
CN4	1	RDS	Remote Data (SUB)
	2	E	GND
	3	SEL	MAIN SUB Select
	4	SQ1	Squelch Volume (MAIN)
	5	BAL	Balance Volume
	6	AV	Audio Volume
	7	E	GND
	8	AOM	Audio Output (MAIN)
	9	AOS	Audio Output (SUB)
CN5	1	MU1	Mute 1 (MAIN)
	2	MU2	Mute 2 (SUB)
	3	MU3	Mute 3 (SUB)
CN6	1	DP1	PLL Data (430 MHz)
	2	CP1	PLL Clock (430 MHz)
	3	EP1	PLL Enable (430 MHz)
CN7	1	E	GND
	2	SF	Standard Freq'
CN8		DO1	Drive Out (430 MHz)
		E	GND
CN9	1	ST1	Stanby (430 MHz)
	2	E	GND
	3	BAND	BAND select
	4	LOW	Low Power Switch
	5	M1	Meter (430 MHz)
	6	CSB	Common Switched +B
	7	8C	Common +8 V
CN10	1	DB	Drive +B
	2	8T2	TX +8 V (144 MHz)
	3	E	GND
	4	PC2	Power Control (144 MHz)
	5	LOW	Low Power Switch
CN11	1	PC1	Power Control (430 MHz)
	2	PRO	Protection
	3	E	GND
	4	8T1	TX +8 V (430 MHz)
	5	BA	Base
	6	DB	Drive +B

Connector No.	Terminal No.	Terminal name	Function
144 MHz TX-RX UNIT (X57-3400-XX)			
CN2	1	E	GND
	2	RA2	RX ANT (144 MHz)
	3	E	GND
CN3	1	E	GND
	2	8T2	TX +8 V (144 MHz)
CN4	1	DO2	Drive Out (144 MHz)
	2	E	GND
	3	E	GND
	4	APS	Speaker (SUB)
	5	MSS	Main EXT. SP. JACK SW.
	6	APM	Audio Power Output (MAIN)
	7	SP	Speaker
CN5	1	E	GND
	2	SP	Speaker
CN6	1	BZ	Beep
	2	AIS	Audio IN (SUB)
	3	CSB	Common Switched +B
	4	AIM	Audio IN (MAIN)
	5	E	GND
	6	8C	Common +8 V
	7	ST2	Stanby (144 MHz)
	8	M2	Meter (144 MHz)
CN7	1	E	GND
	2	DET	Detect (144 MHz)
CN8	1	TO	Tone Output
	2	MIC	Mic input
	3	MIE	Microphone GND
	4	RPT	Cross band Repeater
	5	DP2	PLL Data (144 MHz)
	6	CP2	PLL Clock (144 MHz)
	7	EP2	PLL Enable (144 MHz)
CN9	1	E	GND
	2	SF	Standard Freq'
CONTROL UNIT (X53-3250-XX)			
CN1	1	B	+B (13.8 V)
	2	CSB	Common Switched +B
	3	AV2	Audio Volume 2
	4	8C	Common +8 V
	5	SQ1	Squelch Vol. (MAIN)
	6	E	GND

TERMINAL FUNCTIONS

Connector No.	Terminal No.	Terminal name	Function
CN2	1	BZ	Beep
	2	SC1	Squelch Control (MAIN)
	3	SDO	Signaling Data Out
	4	SC2	Scan Control (SUB)
	5	BAL	Balance Volume
	6	SQ2	Squelch Volume (SUB)
	7	INH	Inhibit (SUB)
	8	M1	Meter (MAIN)
	9	M2	Meter (SUB)
	10	E	GND
	11	5C	Common +5 V
	12	8C	Common +8 V
CN3	1	LB	Lamp +B
	2	E	GND
	3	P90	Port P90
	4	P82	Port P82
	5	DS	Shift Register Data
	6	CS	Shift Register Clock
	7	ES	Shift Register Enable
	8	ET	Tone Enable
	9	CP	PLL Clock
	10	DP	PLL Data
	11	EP1	PLL Enable (430 MHz)
	12	EP2	PLL Enable (144 MHz)
CN4	1	TO	Tone Input
	2	MIC	MIC AF input
	3	ME	MIC AF input for GND
	4	E	GND
	5	RD	Remote Data
CN101	1	BZ	Beep
	2	SC1	Squelch Control (MAIN)
	3	SDO	Signaling Data Out
	4	SC2	Scan Control (SUB)
	5	BAL	Balance Volume
	6	SQ2	Squelch Volume (SUB)
	7	INH	Inhibit (SUB)
	8	M1	Meter (MAIN)
	9	M2	Meter (SUB)
	10	E	GND
	11	5C	Common +5 V
	12	8C	Common +8 V

Connector No.	Terminal No.	Terminal name	Function
CN102	1	LB	Lamp +B
	2	E	GND
	3	P90	Port P90
	4	P82	Port P82
	5	DS	Shift Register Data
	6	CS	Shift Register Clock
	7	ES	Shift Register Enable
	8	ET	Tone Enable
	9	CP	PLL Clock
	10	DP	PLL Data
	11	EP1	PLL Enable (430 MHz)
	12	EP2	PLL Enable (144 MHz)
W1	1	E	GND
	2	B	+B (13.8 V)
W2	1	DP1	PLL Data (430 MHz)
	2	CP1	PLL Clock (430 MHz)
	3	EP1	PLL Enable (430 MHz)
W3	1	ST1	Stanby (430 MHz)
	2	E	GND
	3	BAND	Band select
	4	LOW	Low Power Switch
	5	M1	Meter (MAIN)
	6	CSB	Common Switched +B
	7	8C	Common +8 V
W4	1	SQ2	Squelch Volume (SUB)
	2	SC2	Scan Control (SUB)
	3	E	GND
	4	RDM	Remote Data (MAIN)
	5	SC1	Squelch Control (MAIN)
W5	1	RDS	Remote Data (SUB)
	2	SEL	MAIN SUB Select
	3	SQ1	Squelch Volume (MAIN)
	4	BAL	Balance Volume
	5	AV	Audio Volume
	6	E	GND
	7	AOM	Audio Output (MAIN)
	8	AOS	Audio Output (SUB)
W6	1	MU3	Mute 3 (SUB)
	2	MU2	Mute 2 (SUB)
	3	MU1	Mute 1 (MAIN)
W7	1	E	GND
	2	CI	CTCSS IN
	3	5C	Common +5 V
	4	E	GND
	5	SDO	Signaling Data Out
	6	CT	Tone Clock
	7	DT	Tone Data
	8	ET	Tone Enable

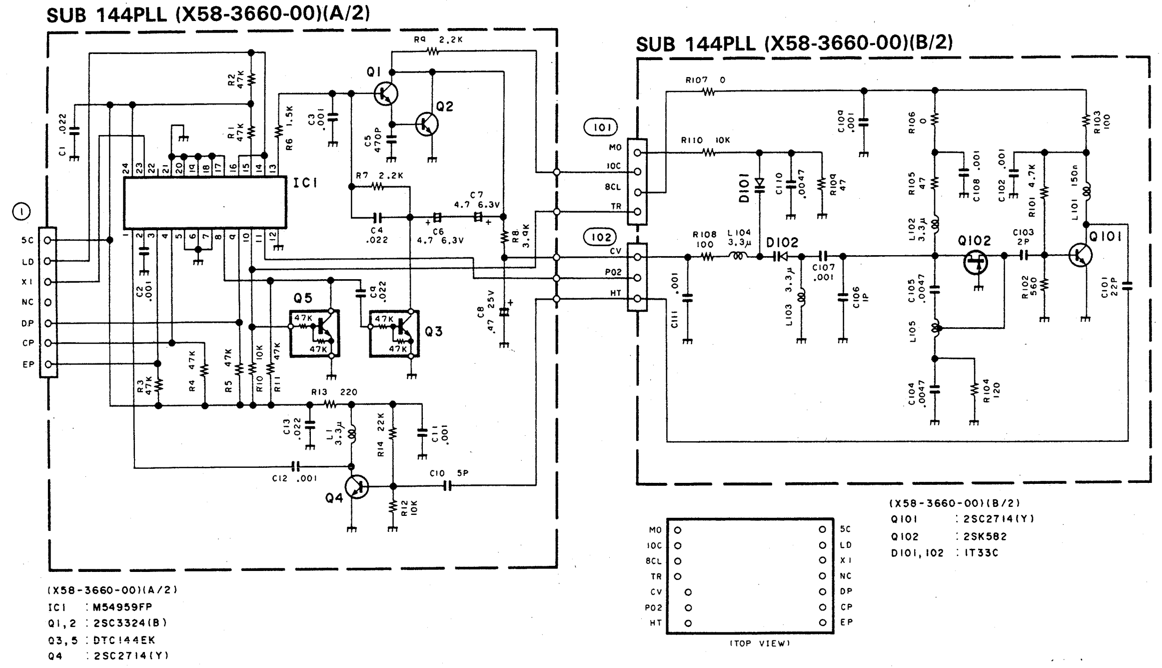
TERMINAL FUNCTIONS

Connector No.	Terminal No.	Terminal name	Function
W8	1	EP2	PLL Enable (144 MHz)
	2	CP2	PLL Clock (144 MHz)
	3	DP2	PLL Data (144 MHz)
	4	RPT	Cross band Repeater
	5	ME	Microphone for GND
	6	MIC	Mic AF input
	7	TO	Tone Output
W9	1	BZ	Beep output
	2	AIS	Audio Input (SUB)
	3	CBS	Common Switched +B
	4	AIM	Audio Input (MAIN)
	5	8C	Common +8 V
	6	ST2	Stanby (144 MHz)
	7	M2	Meter (144 MHz)
W101	1	TO	Tone Input
	2	MIC	MIC AF Input
	3	E	GND
	4	E	GND
	5	RD	Remote Data (MAIN)
W201	1	B	+B (13.8 V)
	2	CSB	Common Switched +B
	3	AV2	Audio Volume 2
	4	8C	Common +8 V
	5	SQ1	Squelch Control (MAIN)
	6	E	GND
FINAL UNIT (X45-3340-XX)			
CN1	1	E	GND
	2	B	+B (13.8 V)
W1,4	—	FB	FINAL +B
W5	1	DB	Drive +B
	2	8T2	TX +8 V (144 MHz)
	3	8T2	TX +8 V (144 MHz)
	4	E	GND
	5	RA2	RX ANT (144 MHz)
	6	E	GND
	7	E	GND
	8	PC2	Power Control (144 MHz)
	9	LOW	Low Power Switch
W6	1	DO2	Drive Out (144 MHz)
	2	E	GND
	3	E	GND
	4	APS	Audio output (SUB)
	5	MSS	Main speaker switch
	6	APM	Audio Power Output (MAIN)
	7	SP	Speaker

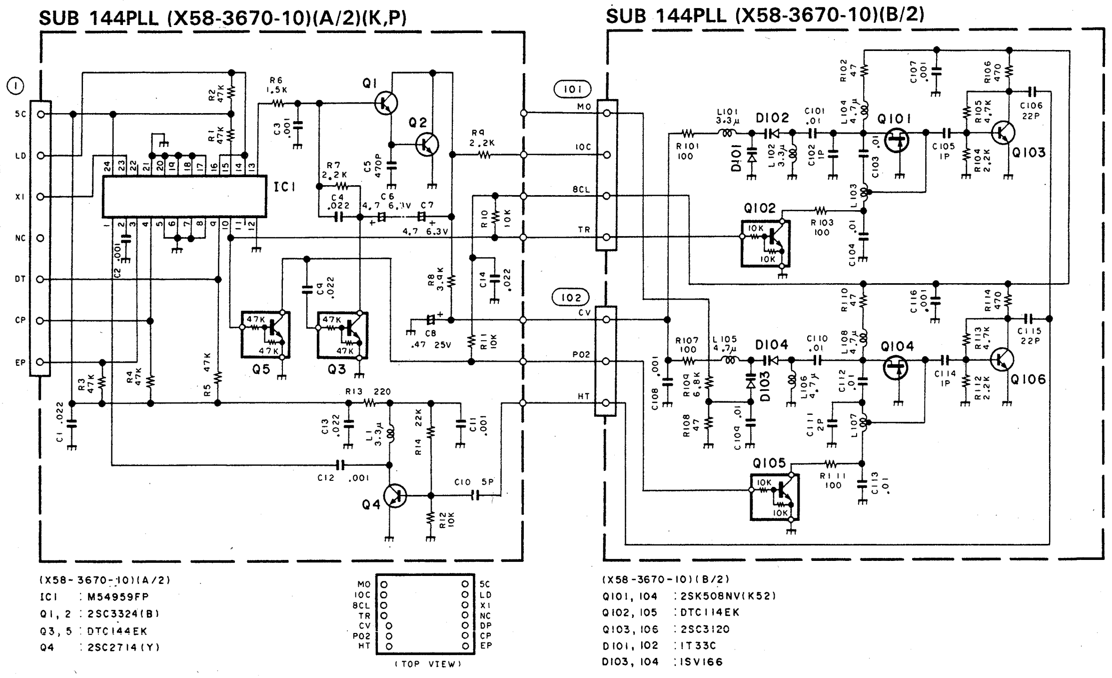
Connector No.	Terminal No.	Terminal name	Function
W7	1	DB	Drive +B
	2	BA	Base +B
	3	8T1	TX +8 V (430 MHz)
	4	E	GND
	5	PRO	Protection
	6	PC1	Power Control (430 MHz)
W8	—	DO1	Drive Out (430 MHz)
	—	E	GND
W9	1	RA1	RX ANT (144 MHz)

TM-731A/E SCHEMATIC DIAGRAM/PC BOARD VIEW

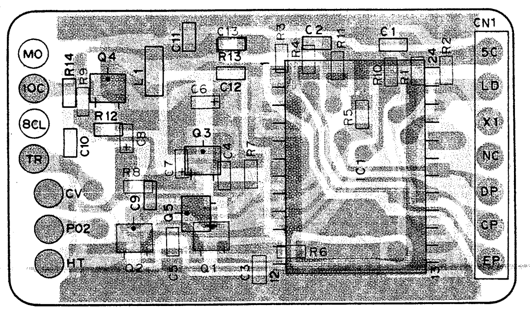
SUB 144PLL (X58-3660-00)(A/2) — SUB 144PLL (X58-3660-00)(B/2)



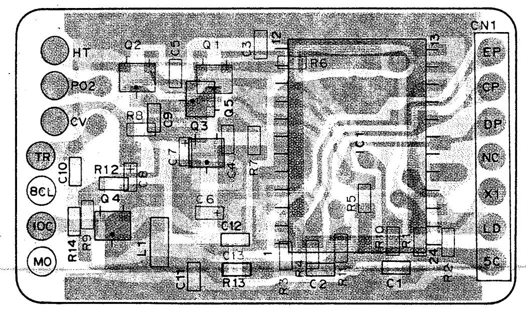
SUB 144PLL (X58-3670-10)(A/2)(K,P) — SUB 144PLL (X58-3670-10)(B/2)



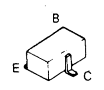
▼144 MHz PLL UNIT A (X58-3660-00)
[Component side view]



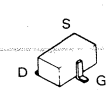
▼144 MHz PLL UNIT A (X58-3660-00)
[Foil side view]



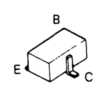
2SC3324



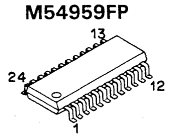
2SK582



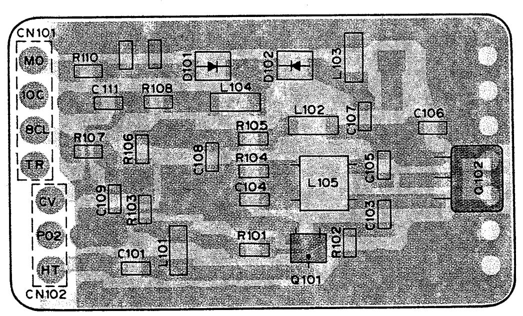
DTC144EK
2SC2712
2SC2714



M54959FP

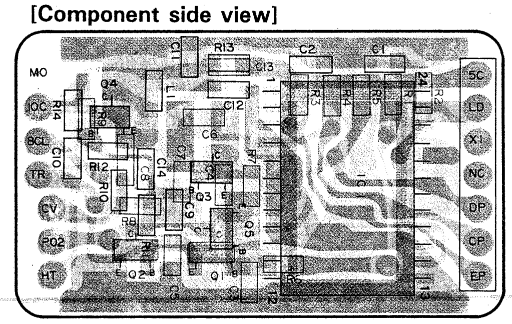


▼144 MHz PLL UNIT B (X58-3660-00)
[Foil side view]

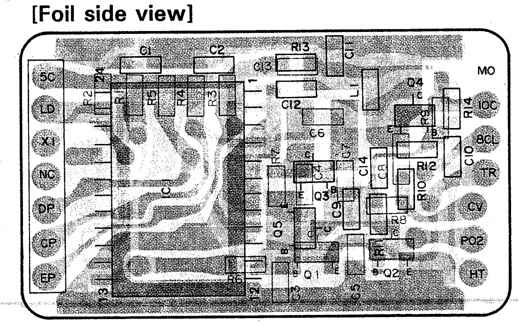


IC1 : M54959FP Q1,2 : 2SC3324(B), Q3,5 : DTC144EK, Q4,101 : 2SC2714(Y),
Q101 : 2SK582 D101,102 : 1T33C

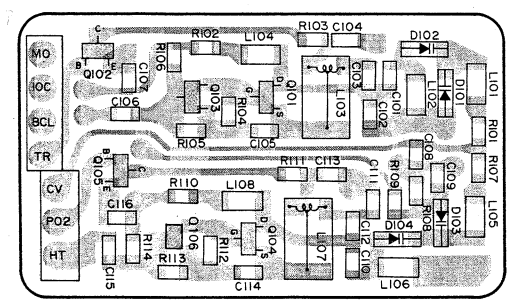
▼144 MHz PLL UNIT A (X58-3670-10)
[Component side view]



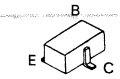
▼144 MHz PLL UNIT A (X58-3670-10)
[Foil side view]



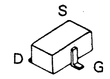
▼144 MHz PLL UNIT B (X58-3670-10)
[Component side view]



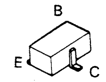
2SC3324



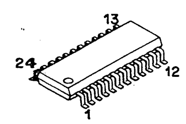
2SK508NV(K52)



2SC2712
2SC3120



M54959FP

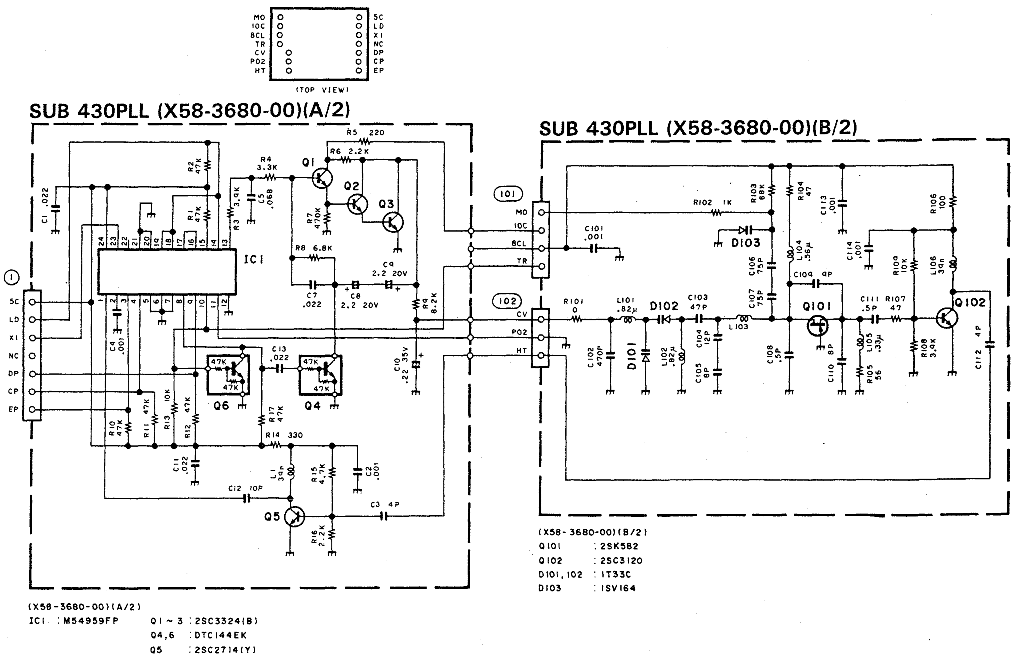


IC1 : M54959FP Q1,2 : 2SC3324(B), Q3,5,102,105 : DTC144EK,
Q4 : 2SC2714(Y), Q101,104 : 2SK508NV(K52), Q103,106 : 2SC3120
D101,102 : 1T33C, D103,104 : 1SV166

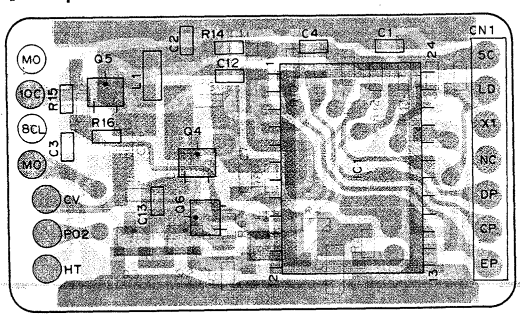
A B C D E

TM-731A/E

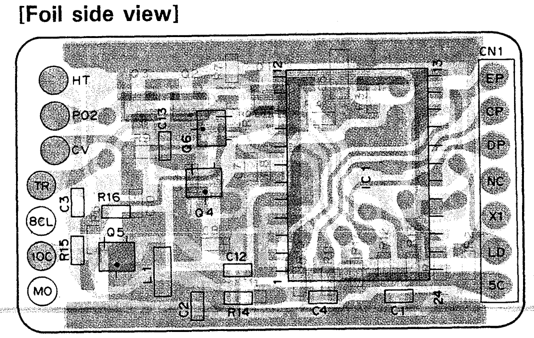
SCHMATIC DIAGRAM/PC BOARD VIEW



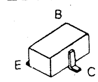
▼430 MHz PLL UNIT A (X58-3680-00)
[Component side view]



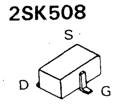
▼430 MHz PLL UNIT A (X58-3680-00)
[Foil side view]



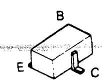
2SC3324



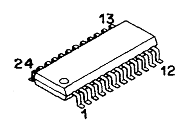
2SK508



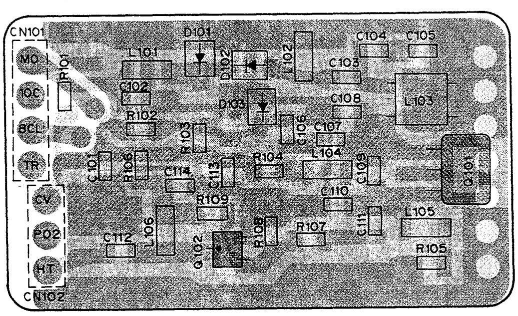
2SC2712
2SC3120



M54959FP



▼430 MHz PLL UNIT B (X58-3680-00)
[Component side view]



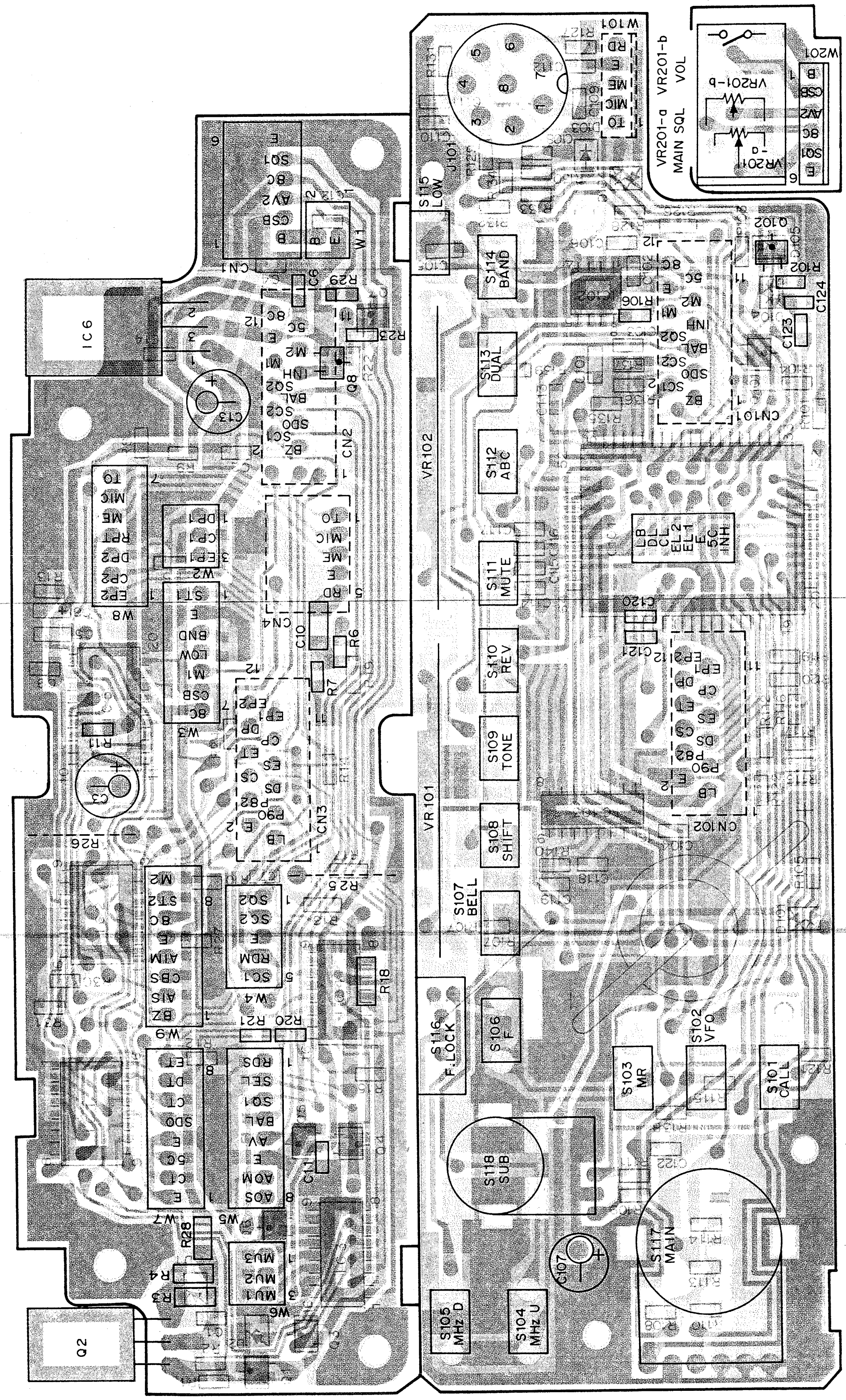
IC1 : M54959FP Q1~3 : 2SC3324(B), Q4,6 : DTC144EK, Q5 : 2SC2714(Y),
Q101 : 2SK582, Q102 : 2SC3120 D101,102 : 1T33C, D103 : 1SV164

A B C D E

TM-731A/E

PC BOARD VIEW

▼**CONTROL UNIT (X53-3250-XX) -11: K,P -21: M, -61: W**
[Component side view]

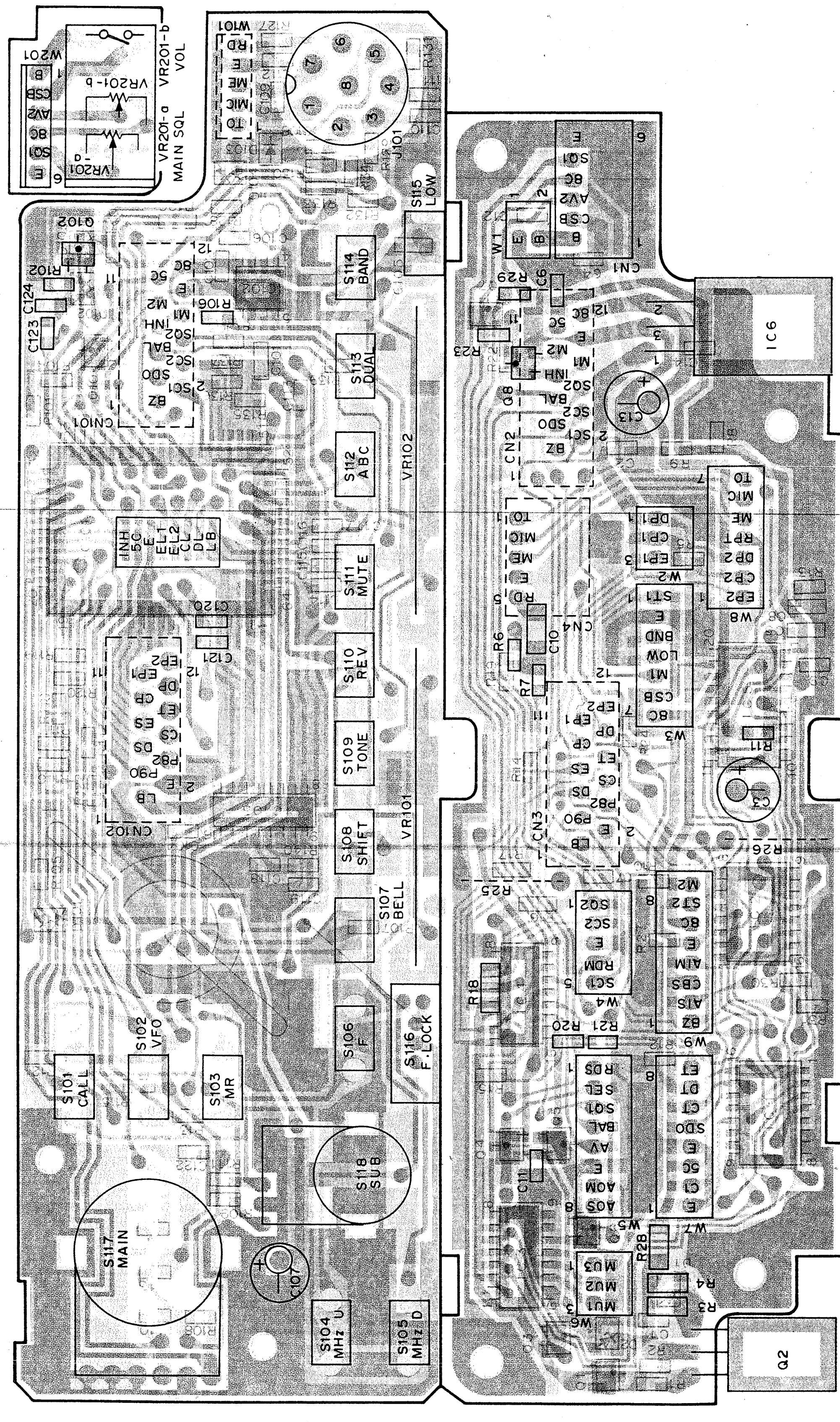


IC1,2 : TC4053BF, IC3,4 : MN4094BS, IC5 : LC7534M, IC6 : MC7808CT, IC101 : 75112GF-530-3BE,
IC102 : LA5006M, IC103 : KRR-C001 Q1,101,102 : 2SC2712(Y), Q2 : 2SC3419(Y), Q3,4,6~8 : DTC114EK,
Q5 : DTA114EK D1 : 02CZ11Y, D2 : 02CZ8.2Y, D101,102,104 : 1SS184, D103 : RLS73, D105 : 02CZ7.5X

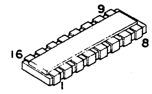
PC BOARD VIEW

TM-731A/E

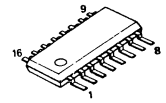
▼CONTROL UNIT (X53-3250-XX) -11: K,P -21: M, -61: W
[Foil side view]



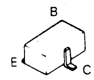
KRR-C001



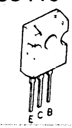
MN4094BS
TC4053BF



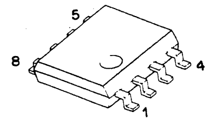
DTA114EK
DTC114EK
DTC114TK
2SC2712



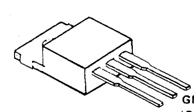
2SC3419



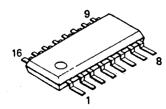
LA5006M



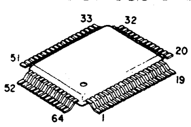
MC7808CT



LC7534M

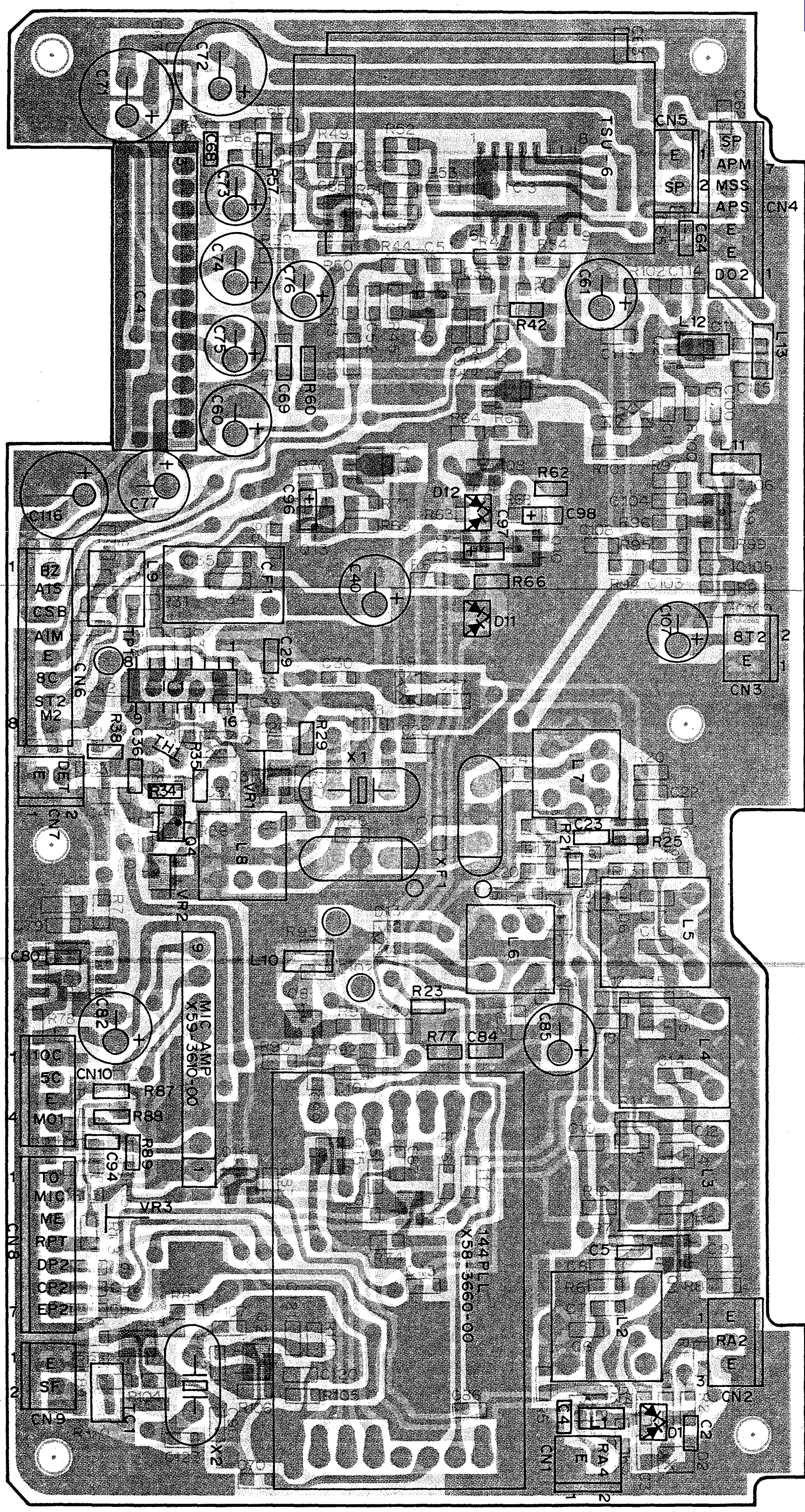


7511ZGF-530-3BE



TM-731A/E PC BOARD VIEW

▼144 MHz TX-RX UNIT (X57-3400-XX) -11: K,P -21: M, -61: W
[Component side view]

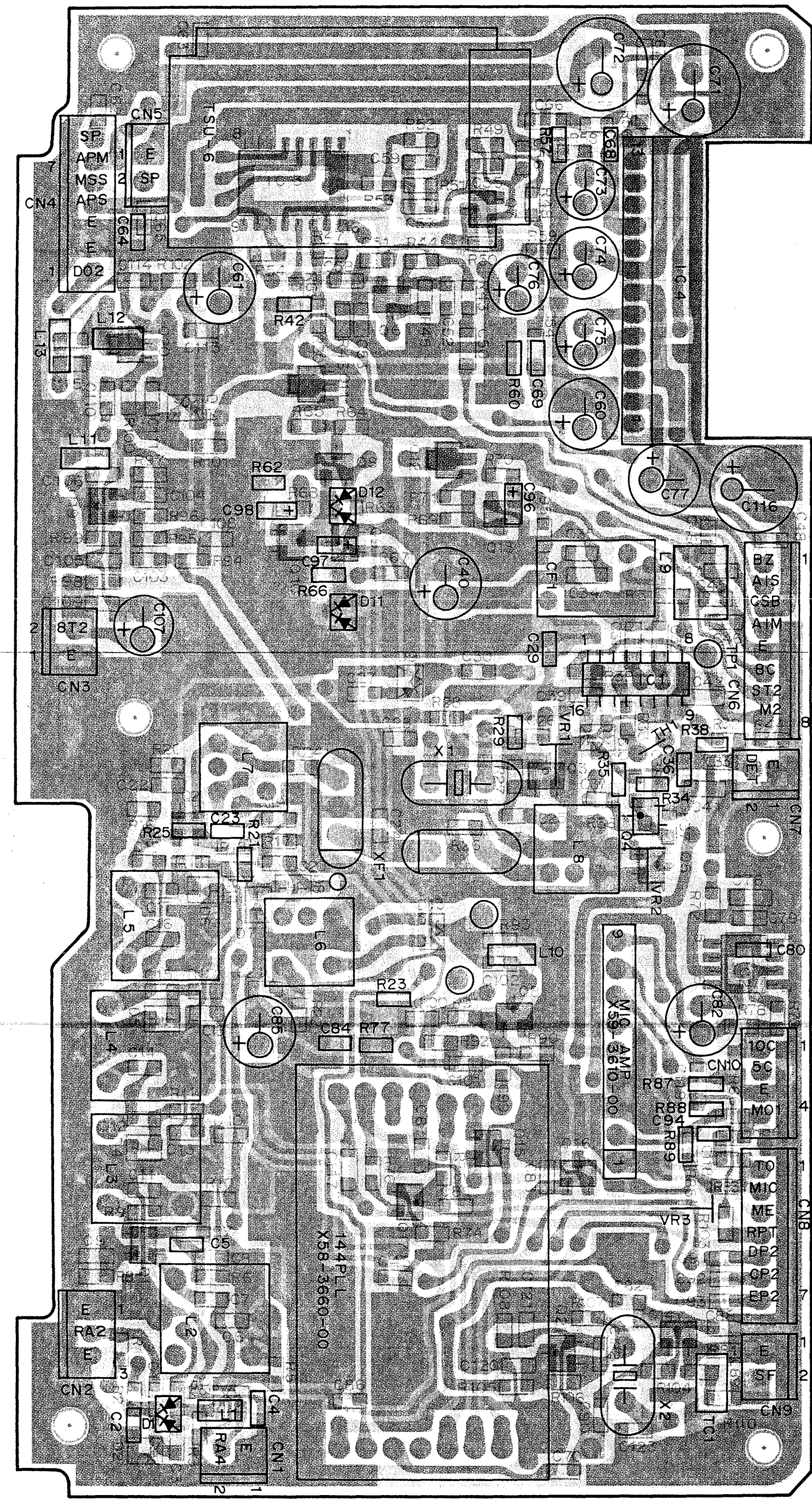


IC1 : MC3361D, IC2 : LA5010M, IC3 : TC4058BF, IC4 : LA4446 Q1 : 3SK184(S), Q2 : 3SK179(L),
Q3,14,18,19,21 : 2SC2714(Y), Q4~10 : 2SC2712(Y), Q13,16 : DTC144EK, Q11,12 : 2SB1119S, Q17 : 2SK208(O),
Q20 : 2SC2954 D4,5,6,8 : 1SV164, D7 : 1SV166, D9,11,12,14 : 1SV184, D10 : HSM88AS, D13 : 1SS268

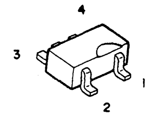
PC BOARD VIEW

TM-731A/E

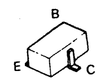
▼144 MHz TX-RX UNIT (X57-3400-XX) -11: K,P -21: M, -61: W
[Foil side view]



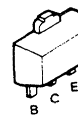
3SK179



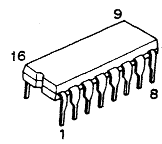
DTA143EK
DTC144EK
2SC2712
2SC2714



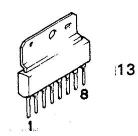
2SB1119S
2SC2954



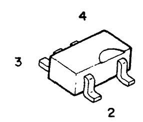
TC4053BF



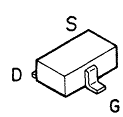
LA4446



3SK184



2SK208(O)

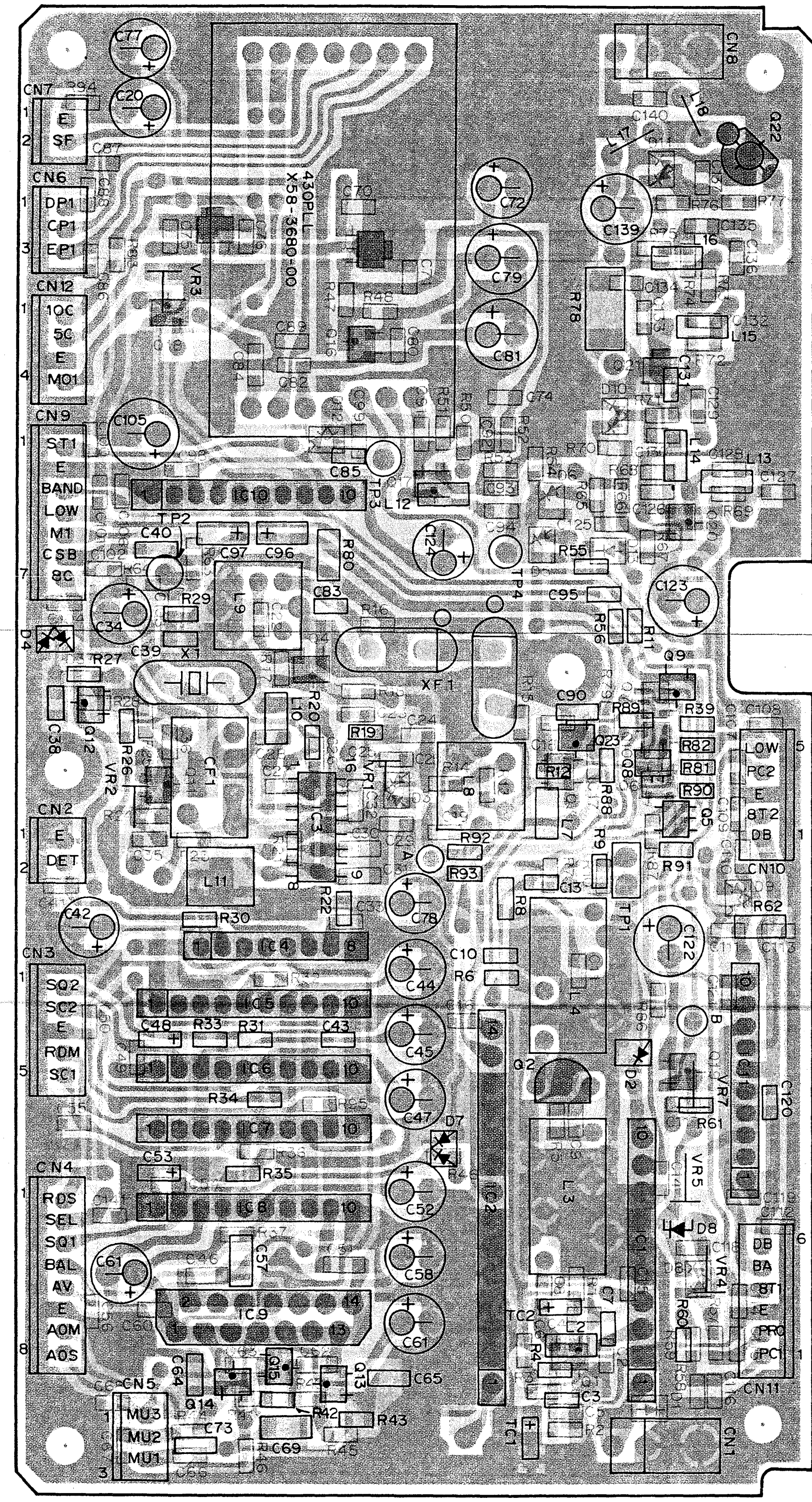


A B C D E

TM-731A/E

PC BOARD VIEW

▼430 MHz TX-RX UNIT (X57-3390-XX) -11: K,P -21: M,W
[Component side view]

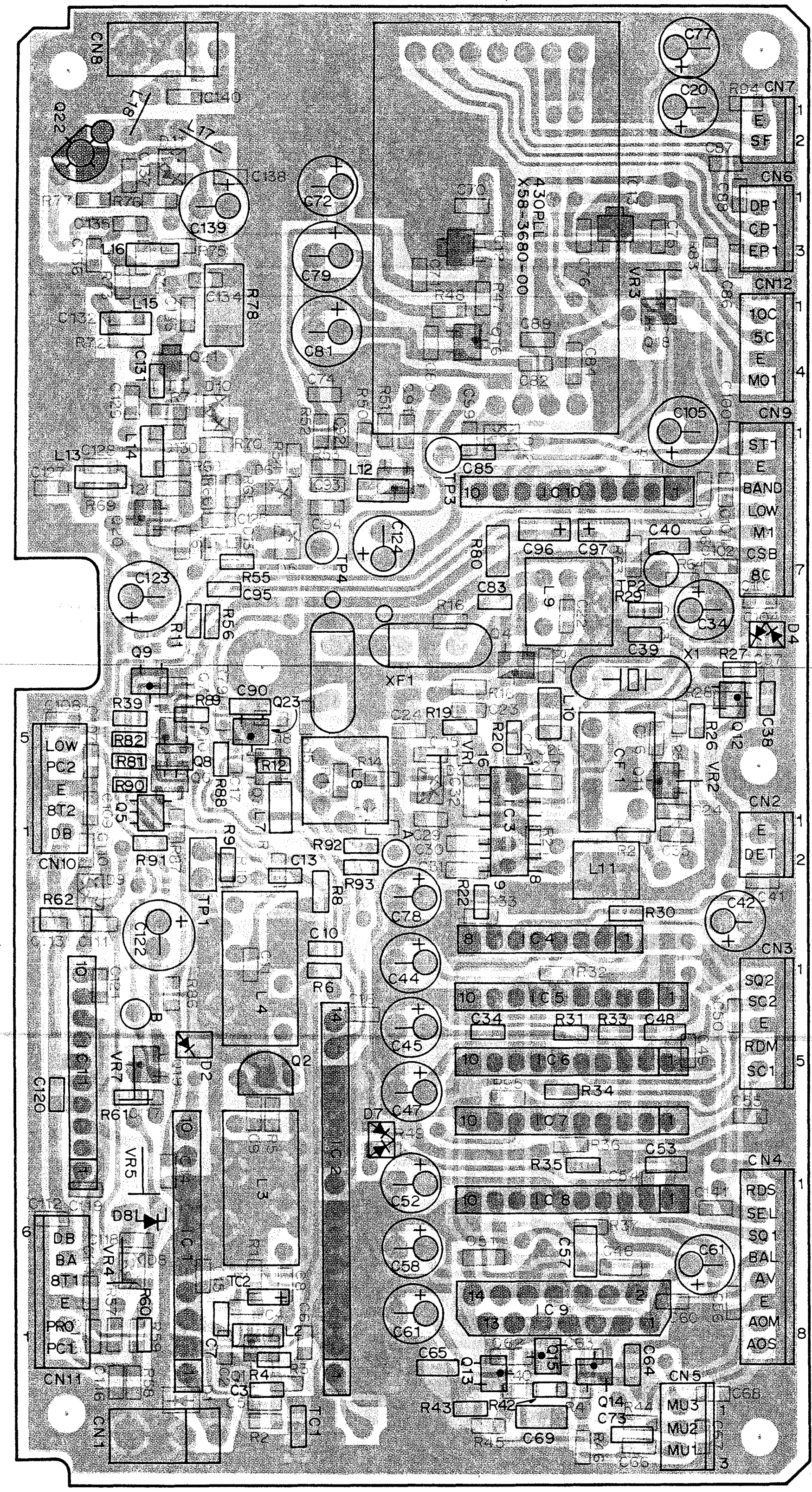


IC3 : MC3361D, IC4 : KCS02, IC5,7 : KCA01, IC6,8 : KCA02, IC9 : M51523AL, IC9 : NJM78L08UA, IC10 : KCS01,
IC11 : KCC01, IC12 : NJM78L08UA, IC13 : NJM78L05UA Q1,3 : 3SK184(S), Q2 : 2SK125, Q4 : 2SC2714(Y),
Q11,12,16 : 2SC2712(Y), Q13,14 : 2SD1757(K), Q15,18,19 : DTC114EK, Q17,20 : 2SC2759(U23), Q21 : 2SC3357,
Q22 : 2SC3369 D1 : HSK277, D3,7,9,12 : 1SS184, D4 : HSM88AS, D5,6 : 1SV128, D8,10,11 : 1SS181

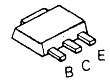
PC BOARD VIEW

TM-731A/E

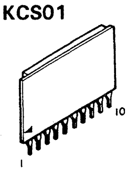
▼430 MHz TX-RX UNIT (X57-3390-XX) -11: K,P -21: M,W
[Foil side view]



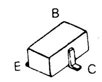
2SC3357



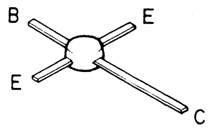
KCA01
KCA02
KCC01
KCS01



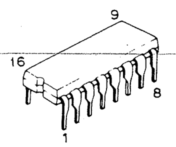
DTC114EK
2SC2712
2SC2714
2SC2759
2SC3326(A)



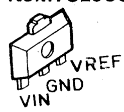
2SC3369



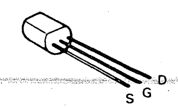
MC3361D



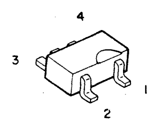
NJM78L08UA
NJM78L05UA



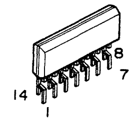
2SK125



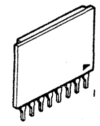
3SK184



M51523AL



KCS02



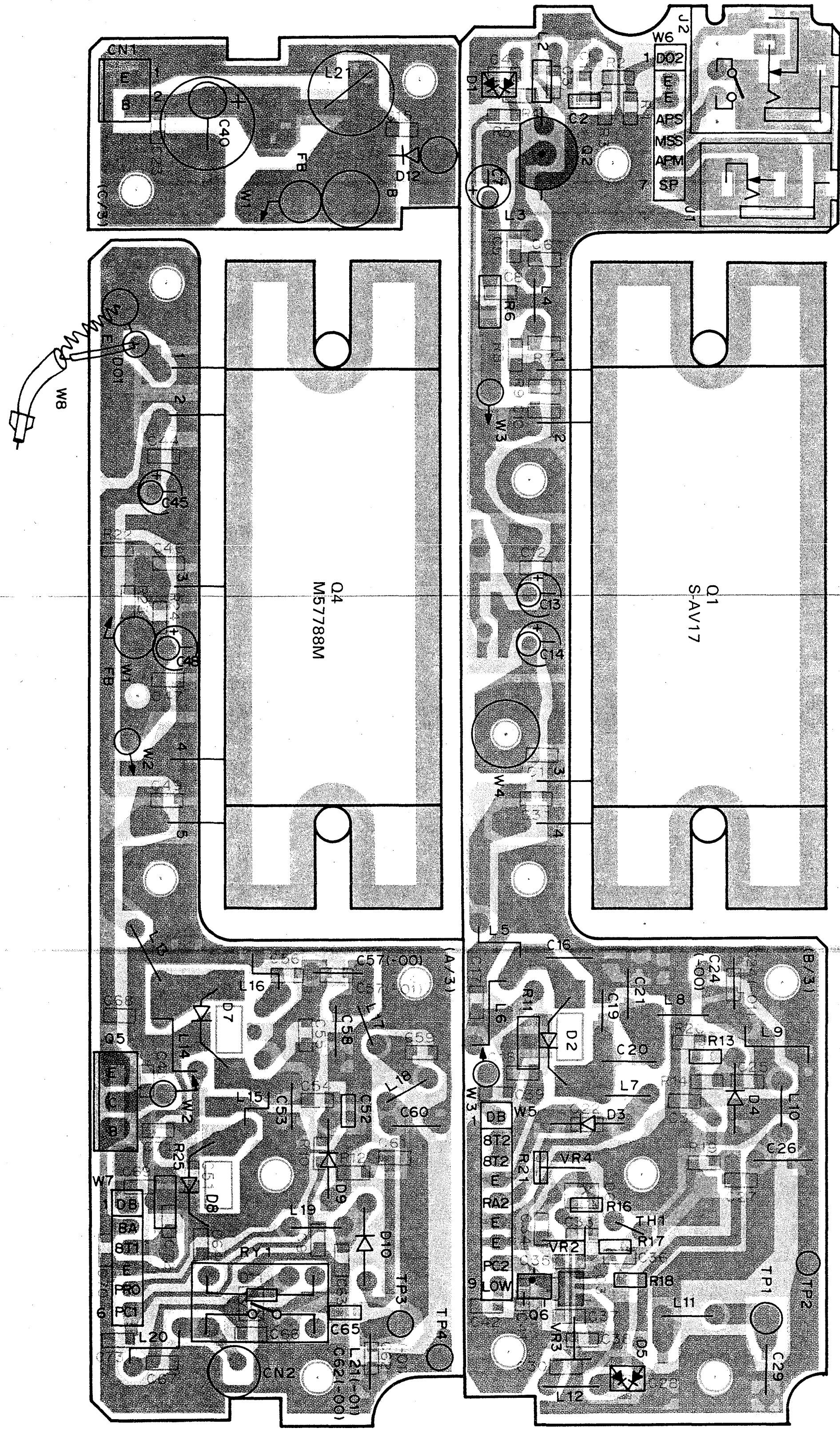
TM-731A/E

PC BOARD VIEW

▼FINAL UNIT (X45-3340-XX)
[Component side view]

▼FINAL UNIT (X45-3340-XX)
[Component side view]

-11: K,P -21: M, -61: W

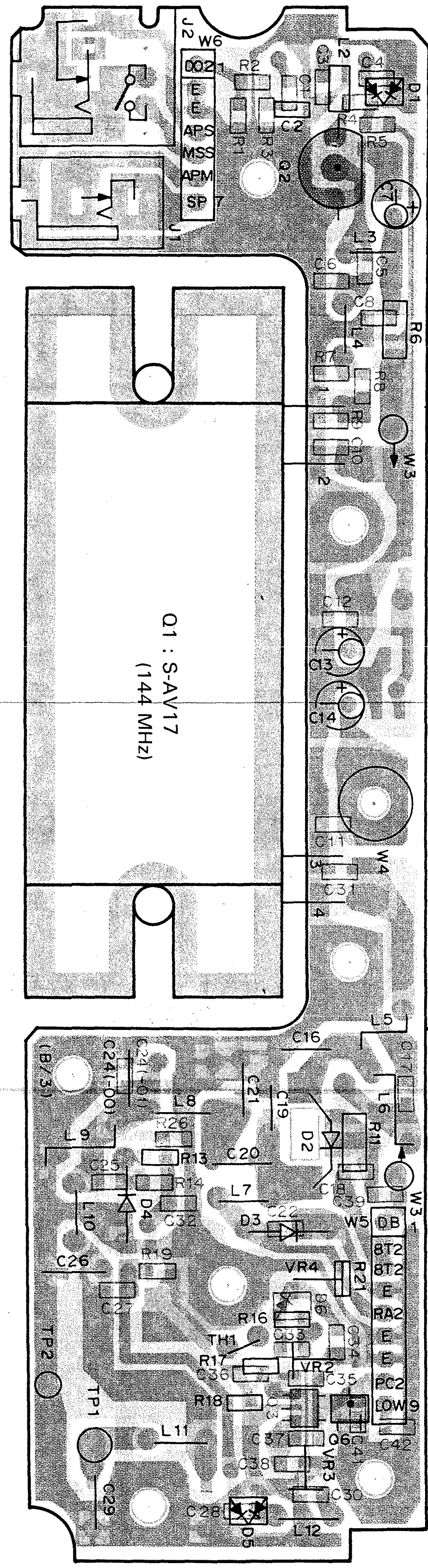


Q1 : S-AV17, Q2 : 2SC2538-22-A, Q3 : FMW1, Q4 : M57788M, Q5 : 2SD1406(Y), Q6 : DTC114EK
D1,5 : 1SS184, D2,7 : UM9401, D3,8 : MI308, D4,9,10 : 1SS101, D12 : DSA3A1

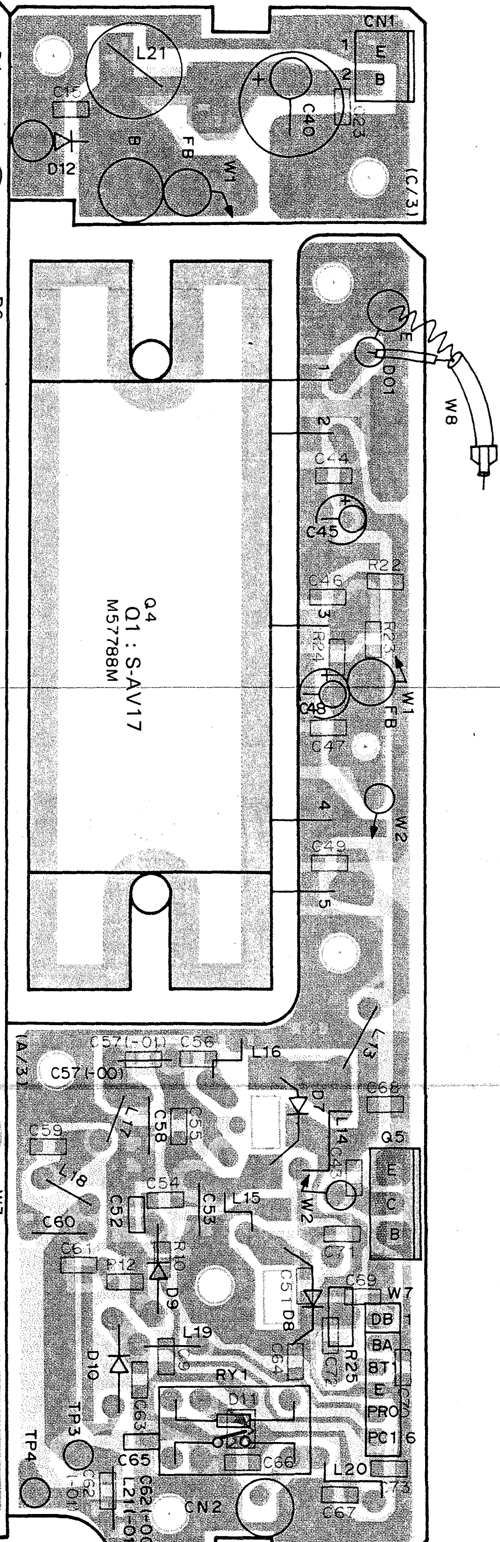
PC BOARD VIEW

TM-731A/E

▼FINAL UNIT (X45-3340-XX)
[Foil side view]

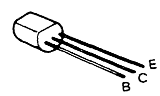


▼FINAL UNIT (X45-3340-XX)
[Foil side view]

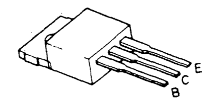


-11: K,P -21: M, -61: W

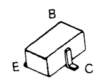
2SC2538-22-A



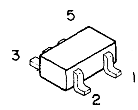
2SD1406



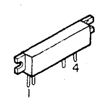
DTC114EK



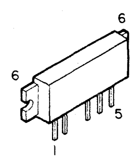
FMW1



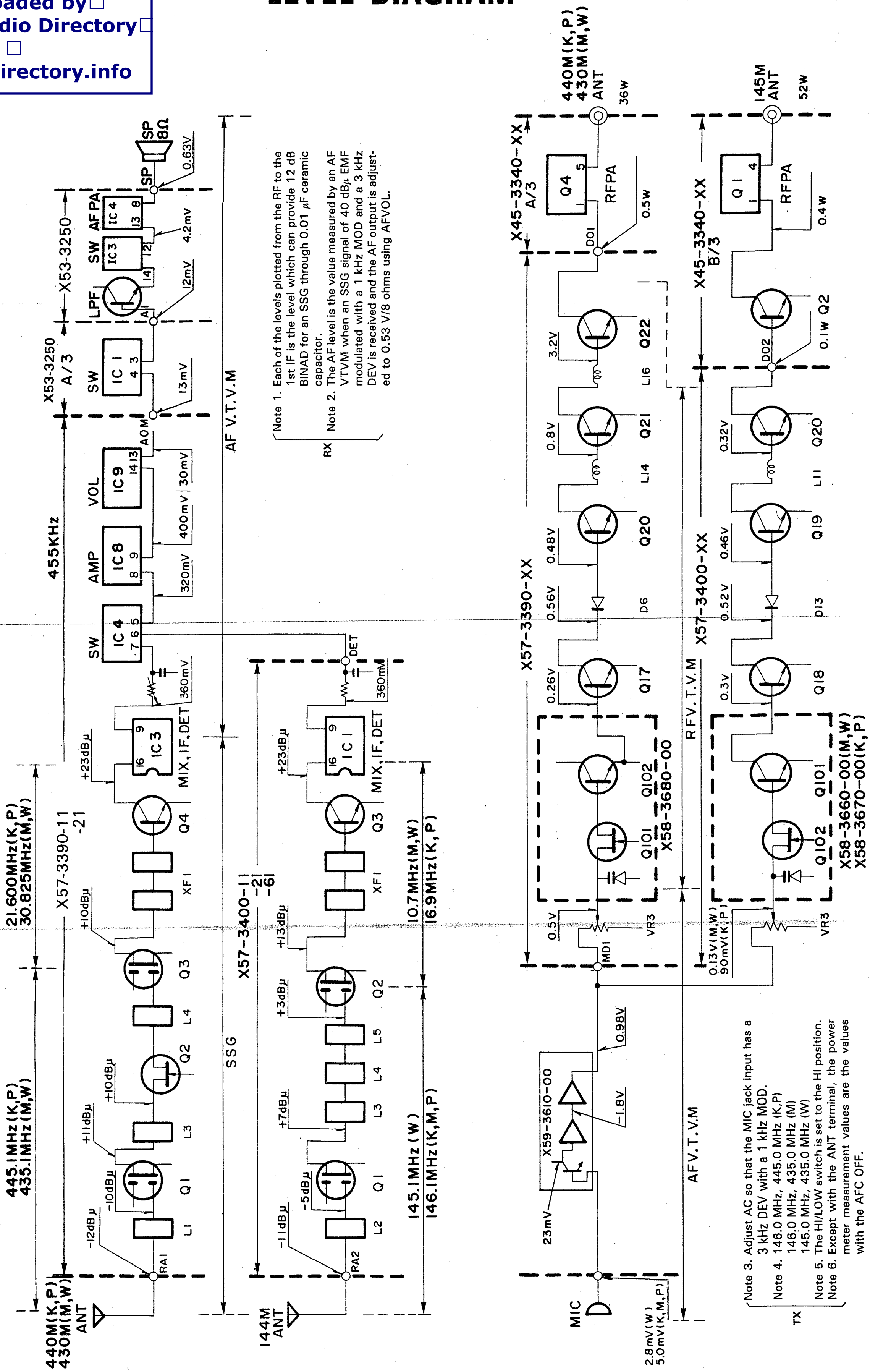
M57726



S-AV17



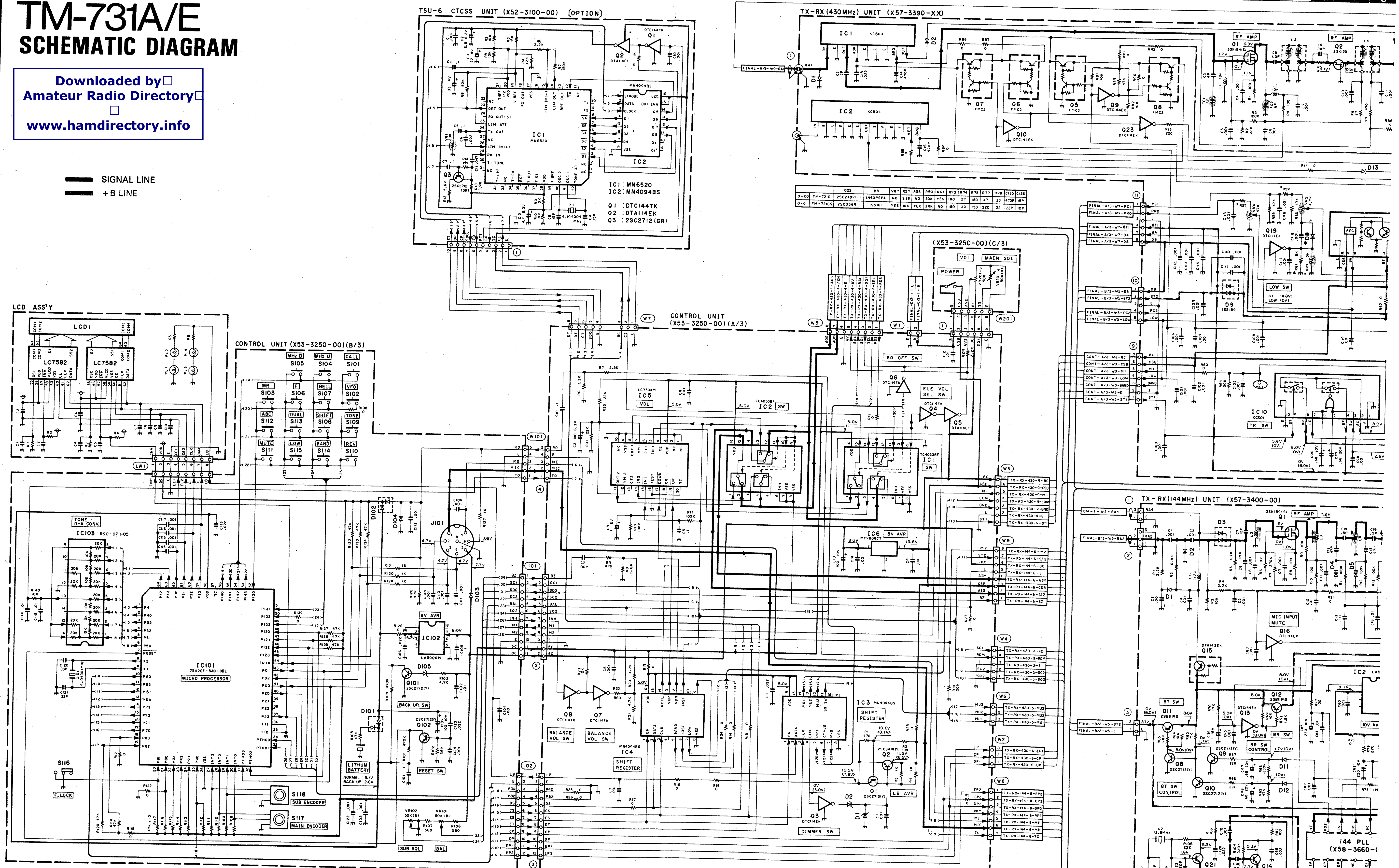
LEVEL DIAGRAM



RX
Note 1. Each of the levels plotted from the RF to the 1st IF is the level which can provide 12 dB BINAD for an SSG through 0.01 μF ceramic capacitor.
Note 2. The AF level is the value measured by an AF VTVM when an SSG signal of 40 dBμ EMF modulated with a 1 kHz MOD and a 3 kHz DEV is received and the AF output is adjusted to 0.53 V/8 ohms using AFVOL.

TX
Note 3. Adjust AC so that the MIC jack input has a 3 kHz DEV with a 1 kHz MOD.
Note 4. 146.0 MHz, 445.0 MHz (K,P)
146.0 MHz, 435.0 MHz (M)
145.0 MHz, 435.0 MHz (W)
Note 5. The HI/LOW switch is set to the HI position.
Note 6. Except with the ANT terminal, the power meter measurement values are the values with the AFC OFF.

TM-731A/E
SCHEMATIC DIAGRAM



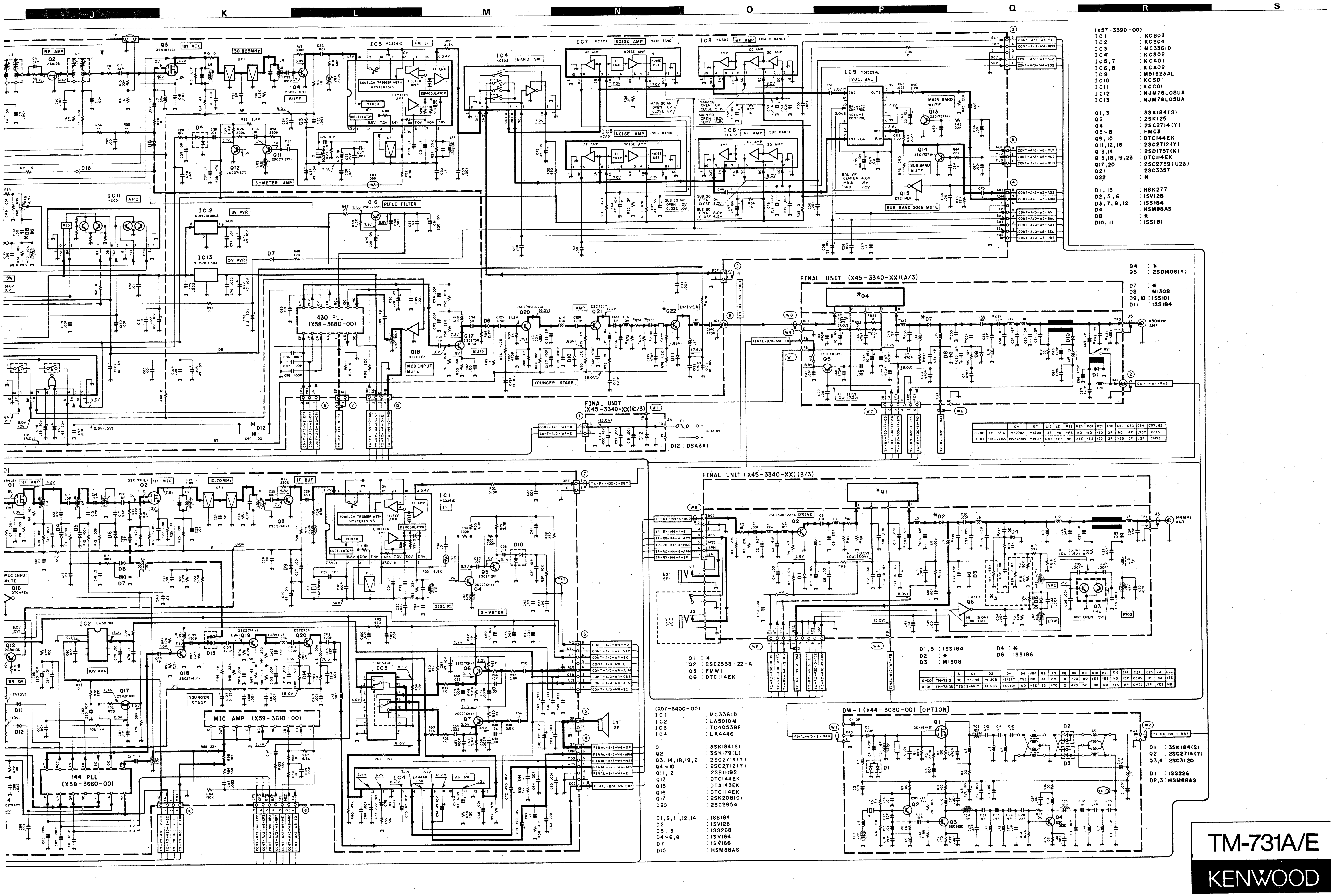
IC101	: 75112GF-530-3BE
IC102	: LA5006M
IC103	: R90-0711-05
Q101, 102	: 2SC2712(Y)

D101, 102, 104	: 1SS184
D103	: RLS-73
D105	: 02CZ7.5X

IC1, 2	: TC4053BF
IC3, 4	: MN4094BS
IC5	: LC7534M
IC6	: MC7808CT

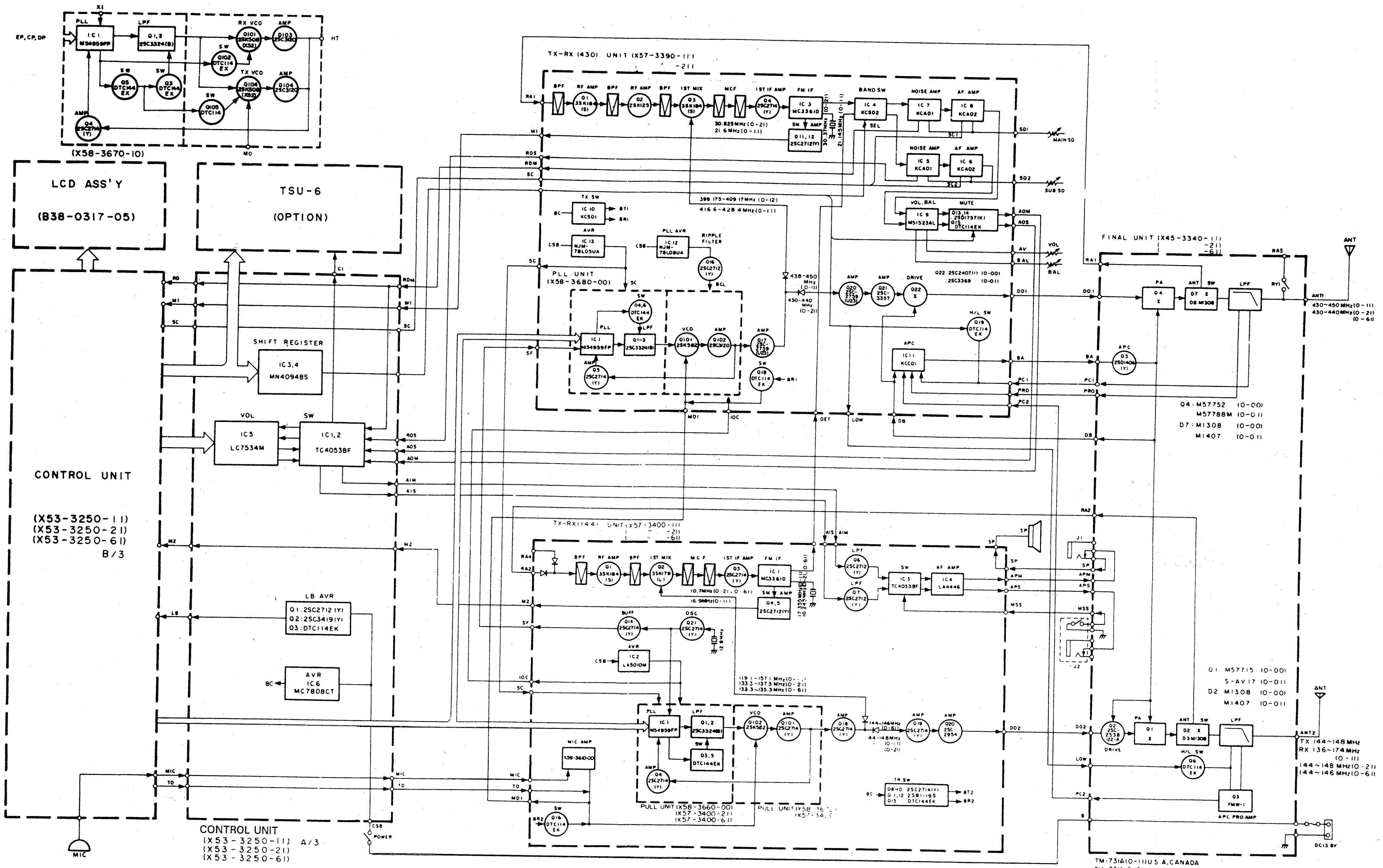
Q1	: 2SC2712(Y)
Q2	: 2SC3419(Y)
Q3, 4, 6, 7	: DTC114EK
Q5	: DTA114EK
Q8	: DTC114TK

D1	: 02CZ11Y
D2	: 02CZ8.2Y


J
K
L
M
N
O
P
Q
R
S
(X57-3390-00)
IC1 : KCB03
IC2 : KCB04
IC3 : MC3361D
IC4 : KCS02
IC5,7 : KCA01
IC6,8 : KCA02
IC9 : M51523AL
IC10 : KCS01
IC11 : KCC01
IC12 : NJM78L08UA
IC13 : NJM78L05UA
Q1,3 : 3SK184(S)
Q2 : 2SK125
Q4 : 2SC2714(Y)
Q5~8 : FMC3
Q9,10 : DTC144EK
Q11,12,16 : 2SC2712(Y)
Q13,14 : 2SD1757(K)
Q15,18,19,23 : DTC114EK
Q17,20 : 2SC2759(U23)
Q21 : 2SC3357
Q22 : *
D1,13 : HSK277
D2,5,6 : 1SV128
D3,7,9,12 : 1SS184
D4 : HSM88AS
D8 : *
D10,11 : 1SS181
Q4 : *
Q5 : 2SD1406(Y)
D7 : *
D8 : M1308
D9,10 : 1SS101
D11 : 1SS184
FINAL UNIT (X45-3340-XX)(A/3)
FINAL UNIT (X45-3340-XX)(C/3)
D12 : DSA3A1
FINAL UNIT (X45-3340-XX)(B/3)
Q1 : *
Q2 : 2SC2538-22-A
Q3 : FMW1
Q6 : DTC114EK
D1,5 : 1SS184
D2 : *
D3 : M1308
D4 : *
D6 : 1SS196
(X57-3400-00)
IC1 : MC3361D
IC2 : LA5010M
IC3 : TC4053BF
IC4 : LA4446
Q1 : 3SK184(S)
Q2 : 3SK179(L)
Q3,14,18,19,21 : 2SC2714(Y)
Q4~10 : 2SC2712(Y)
Q11,12 : 2SB1119S
Q13 : DTC144EK
Q15 : DTA143EK
Q16 : DTC114EK
Q17 : 2SK208(O)
Q20 : 2SC2954
D1,9,11,12,14 : 1SS184
D2 : 1SV128
D3,13 : 1SS268
D4~6,8 : 1SV164
D7 : 1SV166
D10 : HSM88AS
DW-1 (X44-3080-00) (OPTION)
Q1 : 3SK184(S)
Q2 : 2SC2714(Y)
Q3,4 : 2SC3120
D1 : 1SS226
D2,3 : HSM88AS
430 PLL (X58-3680-00)
144 PLL (X58-3660-00)
MIC AMP (X59-3610-00)
TM-731A/E
KENWOOD

TM-731A/E TM-731A/E

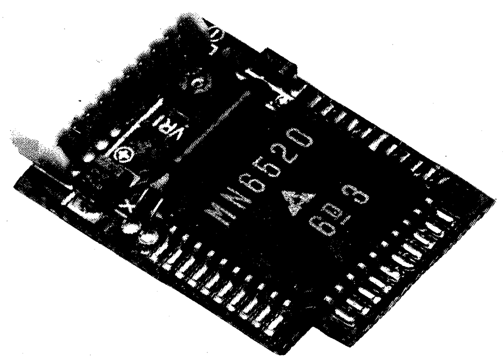
BLOCK DIAGRAM



TSU-
TSU-
Ref. No.
C1
C2
C3
C4,5
C6
C7
C8,9
C10
C11
C12
C13
X1
R1~1
R12~1
VR1
Q1
Q2
Q3
IC1
IC2
TSU-
The t
the ra
nect T
3.

TSU-6 (CTCSS)

TSU-6 EXTERNAL VIEW



TSU-6 PARTS LIST

* New parts

Ref. No.	New Parts	Parts No.	Description
CTCSS UNIT (X53-3100-00)			
C1		CK73FB1H102K	Chip C 1000pF K
C2		C92-0010-05	Tan. C 6.8μF 6.3WV
C3		C92-0006-05	Tan.C 3.3μF 4.0WV
C4,5		CK73EB1E104K	Chip C 0.1μF K
C6		CK73EB1H223K	Chip C 0.022μF K
C7		CK73EB1E104K	Chip C 0.1μF K
C8,9		CC73FCH1H150J	Chip C 15pF J
C10		CK73FB1H102K	Chip C 1000pF K
C11		CK73EB1E104K	Chip C 0.1μF K
C12		C92-0507-05	Chip tan. C 4.7μF 6.3WV
C13		C92-0510-05	Chip tan. C 3.3μF 4WV
		E40-5121-05	Pin ass'y socket (10P)
X1		L77-1313-05	X'tal 4.194304 MHz
R1~10		RK73FB2A000J	Chip R
R12~14		RK73FB2A000J	Chip R
VR1		R12-3460-05	Semi-fixed R 33 kΩ
Q1		DTC144TK	DIGITAL TR
Q2		DTA114EK	DIGITAL TR
Q3		2SC2712(GR)	Chip TR
IC1		MN6520	IC
IC2		MN4094BS	IC

TSU-6 Frequency Fine-Adjustment

The tone frequency can be fine-adjusted in 0.5% steps, in the range from 0 to +1.5%. For the fine-adjustment, connect T1 (pin 10) and T2 (pin 9) of 101 as indicated in Table 3.

	T1	T2
0%	X	X
+0.5%	O	X
+1.0%	X	O
+1.5%	O	O

O : GND, X : OPEN

Table 3

TSU-6 Reference Information

Relationship Between the Main Unit Mode and the MN4094BS (IC2)

CTCSS Switch	TONE Switch	TX/RX	MN4094BS Terminals Q5	Q6	Q1~4, 7, 8
OFF	OFF	TX	L	H	L
		RX	L	H	L
	ON	TX	L	L	See Table 2.
		RX	L	H	L
ON	OFF	TX	L	L	See Table 2.
		RX	H	L	
	ON	TX	L	L	
		RX	H	L	

Q1~4, 7, 8: Tone frequency setting

Q5: MN6520 (IC1) TX/RX switching.
"H": RX, "L": TX.

Q6: MN6520 (IC1) power switching.
"H": OFF, "L": ON.

Table 1

Relationship Between Tone Frequency and the MN6520 (IC1)

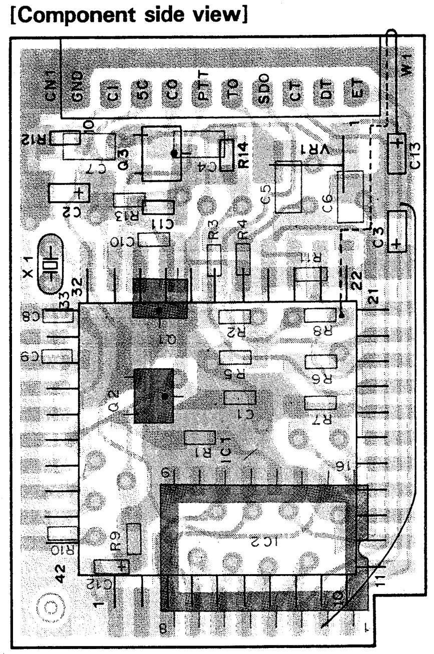
Tone Frequency (Hz)	MN6520 Terminals $\overline{S6}$	$\overline{S5}$	$\overline{S4}$	$\overline{S3}$	$\overline{S2}$	$\overline{S1}$
	MN4094 Terminals Q1	Q2	Q3	Q4	Q7	Q8
67.0	L	H	H	H	L	H
71.9	L	H	H	H	L	L
74.4	L	H	H	L	H	H
77.0	L	H	H	L	H	L
79.7	L	H	H	L	L	H
82.5	L	H	H	L	L	L
85.4	L	H	L	H	H	H
88.5	L	H	L	H	H	L
91.5	L	H	L	H	L	H
94.8	H	H	H	L	L	H
100.0	H	H	H	L	L	L
103.5	H	H	L	H	H	H
107.2	H	H	L	H	H	L
110.9	H	H	L	H	L	H
114.8	H	H	L	H	L	L
118.8	H	H	L	L	H	H
123.0	H	H	L	L	H	L
127.3	H	H	L	L	L	H
131.8	H	H	L	L	L	L
136.5	H	L	H	H	H	H
141.3	H	L	H	H	H	L
146.2	H	L	H	H	L	H
151.4	H	L	H	H	L	L
156.7	H	L	H	L	H	H
162.2	H	L	H	L	H	L
167.9	H	L	H	L	L	H
173.8	H	L	H	L	L	L
179.9	H	L	L	H	H	H
186.2	H	L	L	H	H	L
192.8	H	L	L	H	L	H
203.5	H	L	L	H	L	L
210.7	H	L	L	L	H	H
218.1	H	L	L	L	H	L
225.7	H	L	L	L	L	H
233.6	H	L	L	L	L	L
241.8	L	H	H	H	H	H
250.3	L	H	H	H	H	L

Table 2

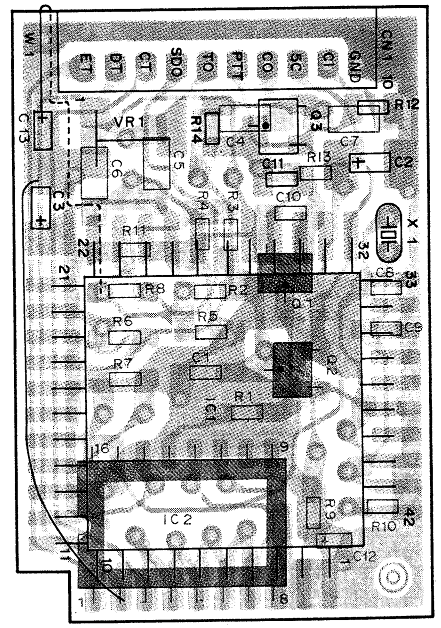
TSU-6 (CTCSS UNIT)

TSU-6 PC BOARD VIEW

[Component side view]

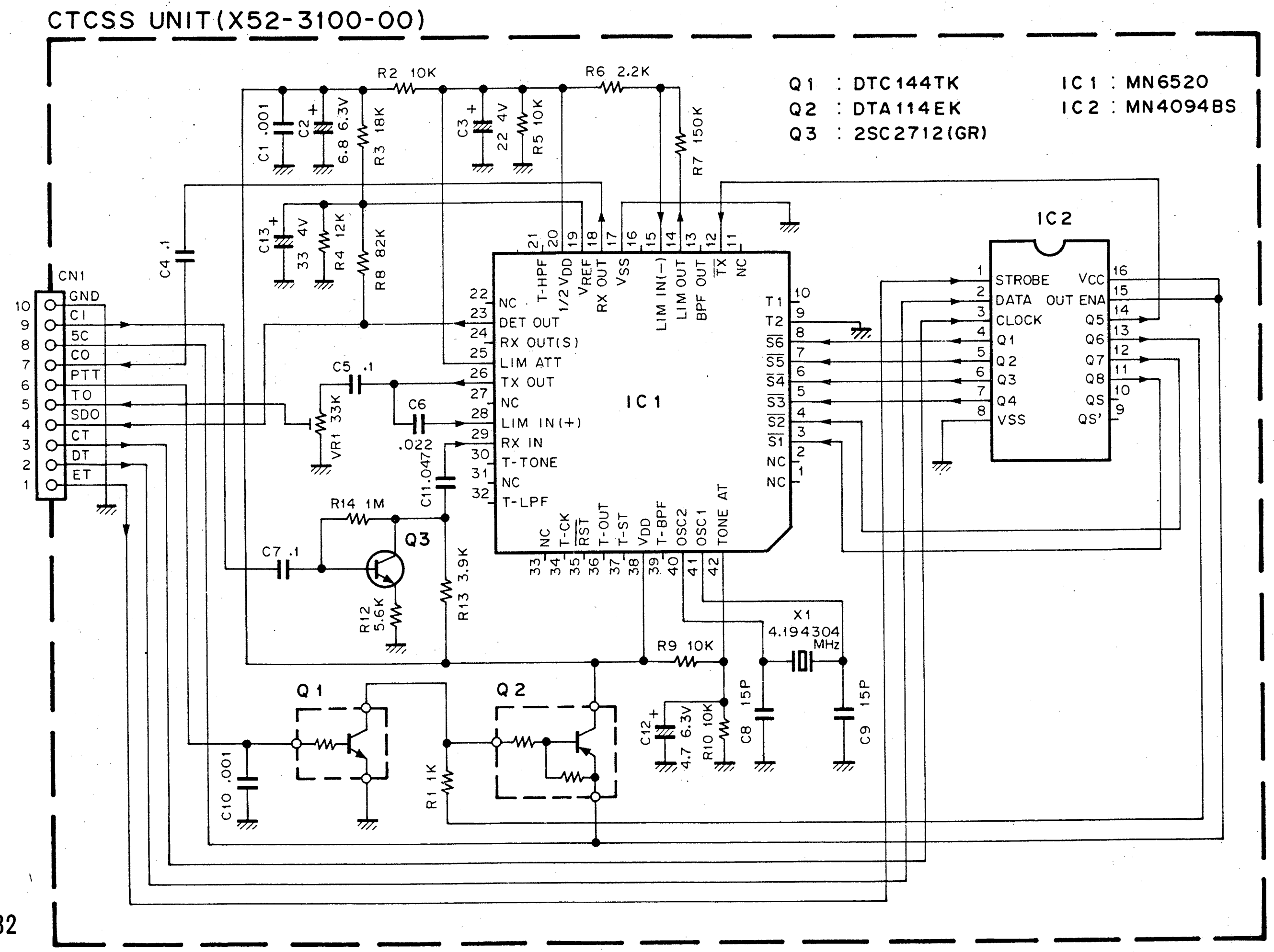


[Foil side view]



: Components side pattern
: Foil side pattern

TSU-6 SCHEMATIC DIAGRAM



TM-731A/E

SPECIFICATIONS

Specifications		Model	TM-731A U.S.A. version	TM-731A Other markets version	TM-731E
General	Frequency range		144 to 148 MHz 438 to 450 MHz	144 to 148 MHz 430 to 440 MHz	144 to 146 MHz 430 to 440 MHz
	Mode		F3E (FM)		
	Antenna impedance		50 ohms		
	Power requirements		13.8 VDC ±15%		
	Ground		Negative		
	Current drain	Transmit mode	Less than 11 A		
		Receive mode with no signal	Less than 0.6 A		
	Operating temperature		−20°C to +60°C (−4°F to +140°F)		
	Dimensions (W×H×D) (Projections included)		150×50×219 mm (5.9″×2″×8.6″)		
	Weight		1.8 kg (3.97 lbs)		
Transmitter	Output power*	HI	144 MHz: 50 W, 220 MHz: 25 W, 430/440 MHz: 35 W		
		LOW	5 W		
	Modulation		Reactance modulation		
	Spurious radiation		Less than −60 dB		
	Maximum frequency deviation		±5 kHz		
	Audio distortion (at 60% modulation)		Less than 3% (300 to 3000 Hz)		
	Microphone impedance		500 to 600 ohms		
Receiver	Circuitry		Double conversion superheterodyne		
	Intermediate frequency	U.S.A. version	144 MHz: 16.9 MHz/455 kHz, 220 MHz: 30.825 MHz/455 kHz, 440 MHz: 21.6 MHz/455 kHz		
		Other market	144 MHz: 10.7 MHz/455 kHz, 430 MHz: 30.825MHz/455 kHz		
	Sensitivity(12 dB SINAD)		144 MHz: Less than 0.2 μV, 220 MHz: Less than 0.18 μV, 430/440 MHz: Less than 0.16 μV		
	Selectivity		−6 dB: More than 12 kHz, −60 dB: Less than 24 kHz		
	Spurious response		Better than 60 dB		
	Squelch sensitivity		Less than 0.09 μV		
	Output		More than 2 W across 8 ohms load (5% distortion)		
	External speaker impedance		8 ohms		

Notes:

1. Circuit and ratings are subject to change without notice due to advancement in technology.
2. *Recommended duty cycle:
   1 minute Transmission, 3 minutes Reception

KENWOOD CORPORATION
Shionogi Shibuya Building, 17-5, 2-chome Shibuya, Shibuya-ku, Tokyo 150, Japan

KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745, U.S.A.

KENWOOD ELECTRONICS DEUTSCHLAND GMBH
Rembrücker Str. 15, 6056 Heusenstamm, West Germany

KENWOOD ELECTRONICS BENELUX N.V.
Mechelsesteenweg 418 B-1930 Zaventem, Belgium

TRIO-KENWOOD FRANCE S.A.
13, Boulevard Ney, 75018 Paris, France

KENWOOD LINEAR S.P.A.
20125, Milano-via Arbe, 50, Italy

KENWOOD ELECTRONICS AUSTRALIA PTY. LTD.
(INCORPORATED IN N.S.W.)
4E. Woodcock Place, Lane Cove, N.S.W. 2066, Australia

KENWOOD & LEE ELECTRONICS, LTD.
Wang Kee Building, 5th Floor, 34-37, Connaught Road, Central, Hong Kong

KENWOOD ELECTRONICS CANADA INC.
P.O. BOX 1075, 959 Gana Court, Mississauga, Ontario, Canada L4T 4C2